AVIATION WEEK

FEB. 21, 1955

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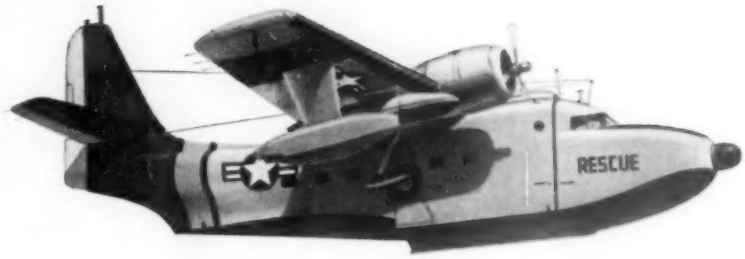

QUEENS OF THE "MAYDAY"

In answer to the airman's emergency distress signal, "Mayday, Mayday", the Albatross has grown from a speck to a queen to many a man marooned in a dinghy or on an icecap. Flown by skilled crews of the U. S. Air Force, Air Rescue Service, the U. S. Navy and Coast Guard, the Grumman Albatross can land and take off from snow and ice, as well as land and sea. Though she doesn't fit into the airman's survival kit, she's part of it.

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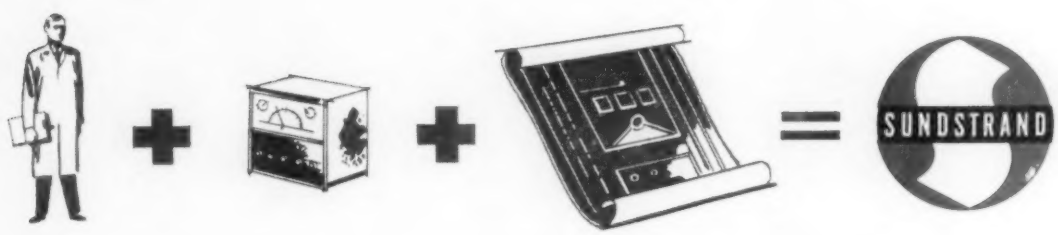
Designers and builders also of the supersonic Tiger, Cougar jet fighters, S2F sub-killers, metal boats, and Aerobilt truck bodies.

SUNDSTRAND'S EXPANDED TEST FACILITY SPEEDS PRODUCTION



The present stage of Sundstrand Aviation's expansion of its test facility for Constant Speed Drives is now complete. Here, activities are on a 24-hour, 7-day-a-week basis to provide uninterrupted life testing of the drives on simulated operation cycles. Here, more equipment, more instrumentation permit duplication of airplane systems' characteristics. Here, a greatly increased number of test stands permits simultaneous scheduling of experimental work and production testing. With a trained staff of specialized engineers and technicians . . . with sensitive, precise equipment . . . with more area to accommodate increased activities . . . Sundstrand provides the answer to steadily increasing demands for its drives. Call on us for help on your a-c power generation problems.

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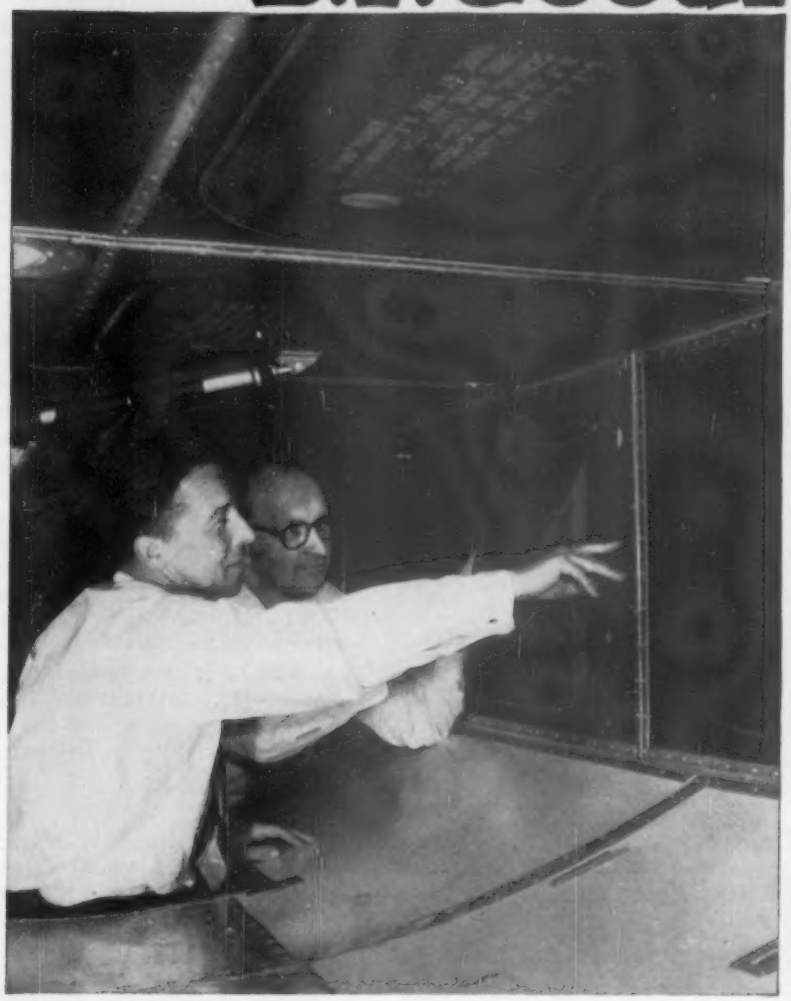

New baggage panel is air-tight yet easily opened, strong yet flexible

PLANS for Lockheed's Super Constellation called for two big baggage compartments in the lower section of the fuselage. But the panels lining the compartments presented some tough engineering problems.

These panels had to seal out air to meet CAA safety regulations. Yet made to open fast for servicing equipment in 33 places. Flexible enough to fit around tricky contours. Yet strong and abrasion resistant enough to take the impact and scuffing of shifting baggage, and resistant to oil, flame and aging.

It seemed like an almost impossible job—even for rubber. Called in by Lockheed, B. F. Goodrich engineers went after the answers. First, they made the panels out of a glass fabric combined with a special rubber compound. Not only did the panels prove age-resistant, oil-resistant and flame-resistant, they had the necessary flexibility, wear-resistance *and* strength. They even passed a severe "guillotine test" that simulated the impact of heavy, sharp-cornered baggage.

Then B. F. Goodrich Pressure Sealing Zippers were added to the panels. The zippers' overlapping rubber lips (see right above) provided a pressure-tight seal against air. Yet they are zipped open quickly and easily to let maintenance men get at equipment on either side and over the compartments.

The new panels completely filled the bill. The picture above left, taken from inside a Super Constellation's baggage compartment, shows panels lining one side and top.

This is one more example of how B. F. Goodrich rubber research and engineering can solve the most difficult aviation problems. B. F. Goodrich products for aviation: tires, wheels and brakes; heated rubber; De-Icers; Avtrim; Pressure Sealing Zippers, inflatable seals; fuel and oil cells; Rivnuts; hose and other accessories. *The B. F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

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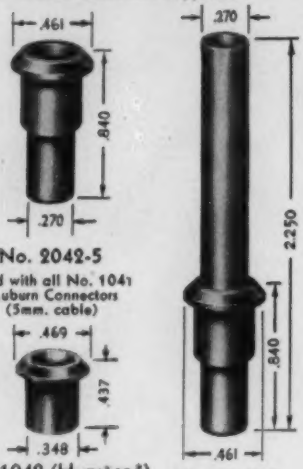
Ozone Resistant Hypreen*



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No. 1042 (Hypreen*)
No. 1043 (Silicone)
Used with all No. 1041 Auburn Connectors (7mm. cable)

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*Auburn Synthetic Rubber

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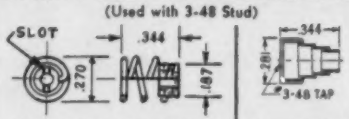

No. 1066-9A (AN 4164-22) with stainless steel coil springs

No. 1066-9V with Inconel volute springs

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with Inconel volute springs

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1041-M Mycalex
1041-D Alumina
(AN 4164-2)

1099-C Steatite
1099-M Mycalex
1099-F Phenolic
1099-D Alumina
(AN 4164-1)

1041 1099

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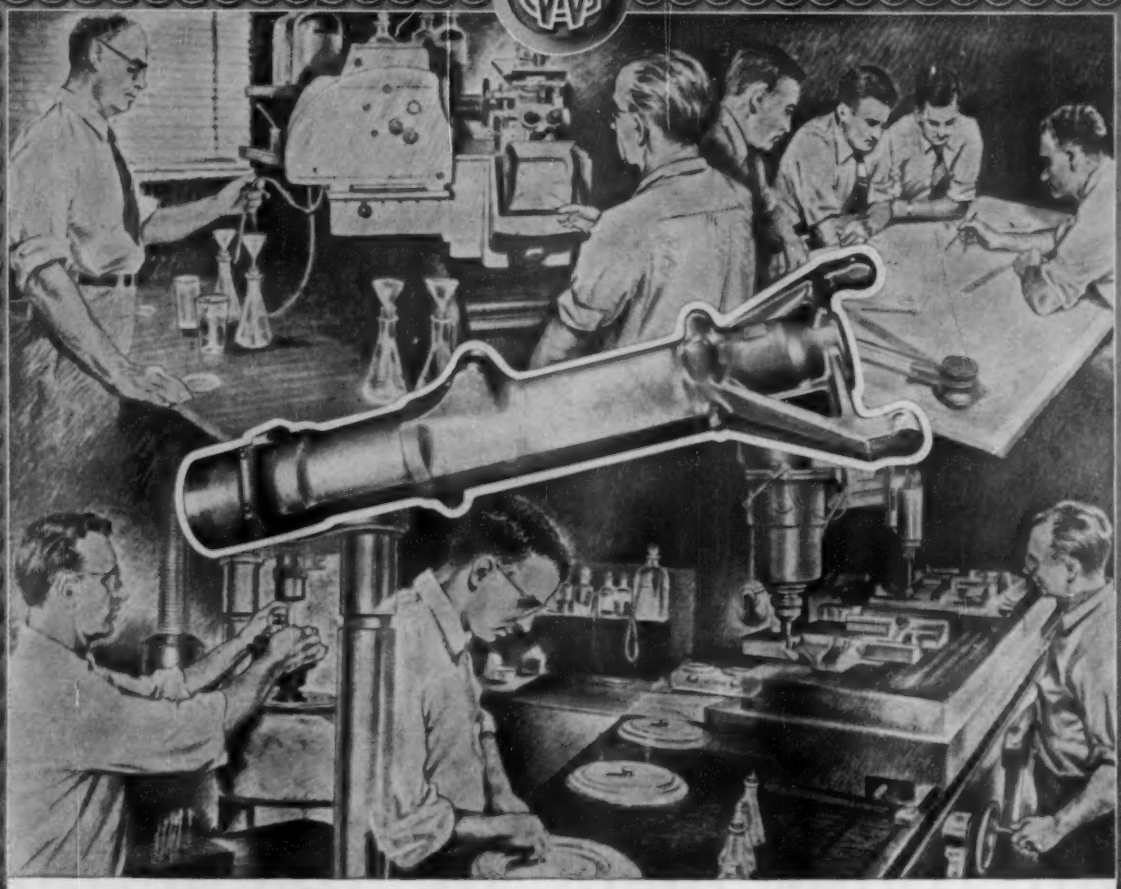

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NEWS DIGEST

Domestic

Rear Adm. James S. Russell has been nominated to replace Rear Adm. Apollo Soucek as chief of Navy's Bureau of Aeronautics. He is coming to Washington, D. C., from command of Carrier Division 5, recently operating off the Tachen Islands. Adm. Soucek is confined to Bethesda Naval Hospital and is expected to retire.

Allegheny Airlines and Southwest Airways have purchased the assets of California Central Airlines for $800,000. The deal includes four Martin 2-0-2s and two DC-3s with spares. Allegheny will get three of the 2-0-2s, plans to take possession of them in time to work the transports into its system next May.

Air Force B-57s have been grounded following two recent crashes. Glenn L. Martin Co., builder of the twin-jet bomber, requested the action pending an investigation.

McDonnell F3H-1N Demon climbed from a standing start to 10,000 ft. in 71 seconds at Lambert-St. Louis Municipal Airport, setting a new unofficial record. The climbing mark was the third set by Navy jet fighters in the past three weeks. North American FJ-3s streaked to records of 73.2 and 83 seconds late last month (AVIATION WEEK Feb. 7, p. 7).

Sen. Bourke Hickenlooper, former chairman of the Joint Congressional Atomic Energy Committee, said he would not oppose the nomination of Trevor Gardner to be Assistant Secretary of the Air Force for Research and Development. This appears to clear the way for confirmation. Senate Armed Services Committee approved the nomination last year, but because of Hickenlooper's request for additional time to consider the appointment the Senate failed to act in the closing days of the session. The Armed Services Committee has set Feb. 24 for a hearing on the nomination.

Mechanized assembly machine for building avionic equipment, General Mills' new Autofab, will go to International Business Machines Corp. to speed production of large digital computers slated for air defense. Autofab's estimated output: 20 printed-circuit assemblies per minute.

John F. Wallace, 62, designer and builder of the first aircraft strut and pneumatic-hydraulic shock absorber and former vice president of the Cleveland Pneumatic Tool Co., died Feb. 13 in Cleveland.

New Edo Floats Make Cessna 180 Amphibious

First view of 225-hp. Cessna 180 business plane fitted with Edo Corp.'s new amphibian float gear that permits operation from land and water (Aviation Week Nov. 15, 1954, p. 108). First deliveries of the new floats are scheduled for May of this year. Wheel retraction is by an electro-mechanical system. Nose wheels are full swiveling. De Havilland-Canada has been testing a Beaver on amphibious floats.

Walter P. Balderston, 71, pioneer in aircraft instrument and control development and founder of Pacific Scientific Co., died Feb. 10 at Glendale, Calif.

Financial

Grumman Aircraft Engineering Corp., Bethpage, N. Y., reports a net income of $11,214,853 for 1954, a sharp increase over 1953's $7,129,341. Sales and other revenues dropped to $235,578,127 from $241,034,150. The higher profits reflected Grumman's reduced tax liability.

Delta-C&S Air Lines has recalled $2.5 millions of its 5½% convertible (subordinated) debentures, will redeem them at 103% of the principal amount plus interest to Feb. 21. The debentures were due May, 1973.

Doman Helicopters' stockholders last week voted to increase the company's authorized capitalization from the present 1 million shares to 3 million for "anticipated expansion" of its Danbury, Conn., activities.

International

British Overseas Airways Corp.'s continued faith in de Havilland Comets was confirmed last week by Britain's Minister of Transport and Civil Aviation Boyd Carpenter, who said the airline will not cancel its orders for Comet 2s and 3s and may purchase three more series 3s.

Air-ground-sea search late last week failed to find a Sabena Belgian Airlines DC-6 that disappeared Feb. 13 as it neared Rome's Ciampino Airport on a flight from Brussels to Leopoldville, Belgian Congo. Twenty-nine persons were aboard.

Trans-Canada Air Lines plans to spend $18 million on new equipment in 1955. Largest expenditure of the government-owned airline: $11,512,000 for new aircraft, practically all turboprop Vickers Viscounts, to be delivered this year.

Canadian Pacific Airlines has ordered two more Douglas DC-6Bs for its transpolar route from Vancouver to Amsterdam, now scheduled to open June 2 with weekly flights of combination coach-first class transports (AVIATION WEEK Jan. 31, p. 7). The new DC-6Bs will be delivered early next year.

Avro CF-100 MK. 4s probably will go into service this year with eight Royal Canadian Air Force squadrons in Canada and four operating with the North Atlantic Treaty Organization in Europe.

Ryozo Kawanishi, founder and president of Japan's wartime Kawanishi Aircraft Co., now Shin Meiwa Industry Co., died Jan. 24 in Osaka.

as others see us...

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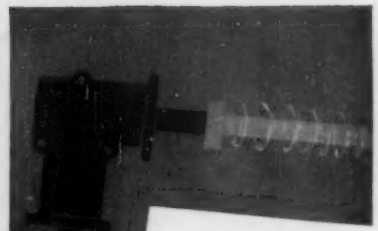

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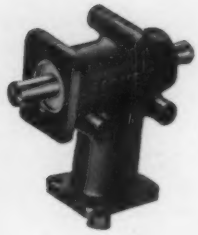

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R-330 3-way	1	1800	1500	2½ lb

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BOEING B-52A PRODUCTION at Seattle is keynoted in first overall view of the project. In foreground, a Stratofortress with vertical tail folded to clear factory doors awaits rollout. Six-man B-52A Stratofort is powered by eight P&W J57 turbojets in 10,000-lb.-thrust class.

Latest Developments in U.S. Military Aviation

KAMAN DRONE HELICOPTER, operated by "pilot" atop hangar (right foreground), has compiled more than 100 hours under remote control. Time includes takeoffs, landings, flight sideward, backward and hovering at various speeds, altitudes and distances, the company reports. A safety pilot is aboard in case of emergency. Project was developed under an Office of Naval Research contract (Aviation Week July 5, 1954, p. 13). Flights have been made at Kaman Aircraft's Bloomfield, Conn. factory.

NORTH AMERICAN FJ-3 FURY (below) takes off from the USS Coral Sea during initial evaluation of a pair of the new fighters. Tests were carried out in the Atlantic, east of Norfolk, Va. First operational tests confirmed earlier simulated carrier trials carried out at Naval Air Test Center, Patuxent River, Md. Official carrier qualification tests of the Wright J65-powered sweptwing FJ-3 will be held in the near future. FJ-3s are built at Columbus, Ohio.

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10

WHO'S WHERE

In the Front Office

Handel Davies, chief superintendent of Britain's Aeroplane & Armament Experimental Establishment at Boscombe Down, has become scientific adviser to the Air Ministry.

Louis A. Cannon is new chairman of the board of Doric Co., Gardena, Calif. **Harold E. Foster** has been elected executive vice president of the aircraft tooling firm.

Edwin F. Shelley has moved up from chief engineer to vice president of Bulova Research & Development Laboratories, Inc., Flushing, N. Y.

William E. Nickey has joined Piasecki Helicopter Corp., Morton, Pa., as assistant to the president. **Horace G. Prall** is new chief inspector.

Changes

Harold Mansfield has taken a leave of absence as public relations director for Boeing Airplane Co., Seattle, to devote full time to two special research projects. **Carl Cleveland** is acting director of public relations.

Vice Adm. Wilder D. Baker (USN Ret.) has become public relations director for Solar Aircraft Co., San Diego. Other changes: **Paul A. Pitt**, chief engineer; **Philip M. Klauber**, chief administrative engineer; **John M. Sayre**, supervisor of advertising and promotion.

David W. Grimm, former engineer for Lockheed Aircraft Corp., has joined Kaynar Co. as chief engineer of the Kaylock Division, Los Angeles.

Lyman A. Bullard, Jr., is manager of Greer Hydraulics' new flight safety products department, New York.

Dr. Emory L. Ellis, prominent rocket scientist, has been appointed director of ordnance planning for the Research & Development Laboratories of Rheem Manufacturing Co., Downey, Calif.

Alex F. Ormsbee has joined the public relations staff of Air Transport Assn., Washington, D. C.

E. C. Sedlack has been appointed works manager of Westinghouse Electric Corp.'s Aviation Gas Turbine Division at Kansas City, Mo.

Charles E. Morris is new manager of aircraft operations of Socony-Vacuum Oil Co., New York.

Clarence J. Sellner has become production manager of Consolidated Engineering Corp., Pasadena, Calif.

Honors and Elections

Richard W. Mock, president of Lear, Inc., was cited for "significant professional achievements" at the centennial celebration of New York University's College of Engineering. Also honored: **Everett B. Schaefer**, assistant chief engineer of Canadair, Ltd.; **Richard G. Bowman**, assistant chief engineer of Republic Aviation Corp., and **C. E. Pappas**, Republic's chief of aerodynamics and thermodynamics.

INDUSTRY OBSERVER

► Operating speed of Lockheed F-104 may be 300-400 mph. faster than current crop of Air Force fighters. Two initial test models of plane have made more than 150 flights and many top-ranking AF officers have flown the aircraft. Production plane probably will appear about middle of 1956. Decision whether plane will be built by Canadair, Ltd., under license, as successor of F-86 Sabre should be made by Canadian government by Apr. 1.

► **Beech Aircraft Corp. is the latest company to enter the guided missile field. A new division, headed by Dr. J. F. Reagon, formerly chief engineer of Radioplane, is being formed in the engineering department to handle the design of missiles and target aircraft.**

► North American is using about 700 lb. of titanium alloy parts in the supersonic F-100, an indication of the increase with which the new metal is being used in airframe makeup. Combined use of titanium alloy sheet by NAA's Los Angeles and Columbus, Ohio, plants, constitutes a substantial chunk of the country's production.

► **Family of tactical missiles developed for the Army has been obsoleted by rapid engineering advances in A-bomb design. Originally designed around conventional explosive warheads as insurance against delays in the nuclear-stores development, the missiles were outmoded before engineering changes could be incorporated.**

► Army procurement of 10 Cessna T-37A jet trainers (AVIATION WEEK Feb. 7, p. 11) for artillery spotting is a package deal. Contract calls for Cessna to train 20 Army pilots and 40 mechanics in Flight and Ground School.

► **Army plans to make the Redstone missile a tactical ballistic missile with a range just beyond the areas of troop deployment on a battlefield. Early concept was a longrange strategic missile. Postwar work on missile was done by ex-German scientists from Peenemuende who are now at Redstone Arsenal, Ala.**

► Bell Aircraft's HSL anti-submarine helicopter for Navy shows signs of engineering fixes for reported "bugs" in the aircraft. Prime-coated external gussets, stiffeners and other structural reinforcements stand out against the blue-painted fuselage.

► **Okanagan Helicopters, Ltd., Vancouver, Canada, now operates 16 Bell 47s and seven Sikorsky S-55s, one of the largest helicopter fleets in the world. Okanagan recently purchased Kenting Helicopters, Ltd., of Toronto.**

► Naval Research Laboratory scientists are proposing to fire a Martin-built Viking research rocket from the deck of the USS Norton Sound in Norwegian waters. Reason: To obtain upper atmosphere data above the northern latitudes. Variations in atmospheric properties over the earth require data points from numerous selected locations.

► **Anderson, Greenwood and Co., former lightplane producers, have received a Defense Department feasibility contract after two years of work on a jet-assisted projectile. Company built its own high-speed test facilities, will build more under the new contract.**

► Bristol Aeroplane Co. will get assistance for production of the Britannia through orders from the Royal Air Force, which will use the plane as a military transport. This is part of Britain's program to develop high mobility for lightly armed ground units.

► **Royal Air Force order for Bristol Britannia turboprop transports will be three Model 250 LRs to start and will be built at Short's Belfast plant. Another five probably will be built for Qantas Empire Airways, and British Overseas Airways Corp. is in the process of picking up its option on eight 300 LR Britannias.**

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Washington Roundup

Less White House Power?

The Pacific route case (AVIATION WEEK Feb. 14, p. 12) has touched off moves in Congress to confine Presidential authority over international route cases strictly to foreign policy issues.

For years, Congressmen have periodically protested White House "interference" in quasi-judicial functions and complained that the 1938 CAA Act makes CAB's decision final on the economic aspects–such as the selection of carriers–final in international, as well as domestic cases. But the understanding that the President originally reversed CAB and authorized Pan American World Airways exclusively (instead of Northwest Airlines, as recommended by CAB) to provide Seattle/Portland to Hawaii air service has spurred action.

• Sen. Warren Magnuson, chairman of the Senate Commerce Committee, plans legislation explicitly limiting Presidential jurisdiction over international route cases.

• Rep. Percy Priest, whose thinking is along similar lines, plans a session with CAB members in the near future "to bring into the open just what did happen" in the Pacific case. "I am sure that the President considered whatever actions he took correct under the CAA Act," Priest commented. "But perhaps some clarification of that act as to White House participation in route decisions is called for."

Different Kinds of Trouble

Pentagon officials are concerned over reports appearing in daily newspapers and nontechnical magazines linking the difficulties encountered by the British Hawker Hunter and the USAF's North American F-100 as "high speed flight problems" of similar nature.

The Hunter is encountering its problems at Mach .9, the low end of the transonic scale, while the F-100 doesn't get into trouble until Mach 1.4, well past the transonic range and into the truly supersonic performance category. Meanwhile, British Vickers Supermarine Swift, once a strong candidate for off-shore procurement with U. S. dollars, has apparently faded completely from the Royal Air Force fighter picture due to control problems at about Mach .9.

Hiding Behind 'Security'

House armed services investigating subcommittee, headed by Rep. Edward Hebert, has taken the lead to curb the practice of government departments of hiding information behind a curtain of false "security"–which congressional committees have long complained has handicapped their investigations.

New rule adopted by the Hebert subcommittee will require all government officials whose presentation is to involve matters affecting security to notify the chairman at least 24 hours in advance of their scheduled appearance, and submit separate statements: one containing nonclassified material and the other containing the classified material. The specific justification for the classification of the security material will have to be cited. The subcommittee will consider as valid, only two types of justification:

• In accordance with the standards for security classification prescribed in the President's executive order of December, 1953, detailing factors which warrant security classifications.

• Matters which involve "executive policy"–or are considered secret because they involve intra-Administration matters. If this type justification is given, the rule declares that the subcommittee "will make the determination" as to whether the information should be released.

The Hebert subcommittee's action followed the refusal of Navy Secretary Charles Thomas to testify in public session on the lag in the naval aircraft procurement program on security grounds. The transcript of the closed-door session was later submitted to Thomas to make deletions justified by security. Thomas' deletions were minor. In fact, some subcommittee members found it difficult to distinguish the changes Thomas made for grammatical reasons from the security changes.

Weeks Versus Willis

Rivalry between Secretary of Commerce Sinclair Weeks and White House assistant Charles Willis over who is going to dominate in Administration decisions on air transportation apparently is increasing.

It is widely reported in congressional circles that the two were diametrically opposed on the recent Pacific case–Weeks strongly supporting Pan American World Airways' position and Willis supporting Northwest Airlines' position.

Key Republicans on Capitol Hill say, privately, that they believe Weeks presented a one-sided picture, highly favorable to Pan American, to the White House on the case. They point out that the President quickly changed his mind on the case after obtaining "additional information" from Minnesota's Sen. Edward Thye, a substantial influence in Republican circles.

Fall-Out and Dispersion

Atomic Energy Commission disclosed a major reason for recent Defense Department emphasis on broader mobilization base and wider dispersion of defense industries (AVIATION WEEK Dec. 20, 1954, p. 12).

The decisive factor: Discovery in last year's hydrogen bomb test that the explosion polluted 7,000 sq. mi. of the Pacific with radioactive fall-out. Defense Secretary Charles E. Wilson said he has known about the fall-out problem for several months. "The only thing you can do," he said, "is to have as many sources of production–dispersion of bases and cities, etc.–as is practical."

Missile Report

Senate Appropriations Committee is annoyed at Defense Department's failure to submit a report on the guided missile program, due Jan. 15. The committee directed the Secretary of Defense to make an investigation last year, after testimony indicated duplication of effort among the services and failure to standardize missiles for approximately the same missions. The report is now in the hands of Defense Department comptroller, Assistant Secretary W. J. McNeil, for "coordination."

Bright Feeder Outlook

Congress appears set to establish a speed record in passing legislation authorizing permanent certification for local service airlines. Senate and House Commerce Committees expect to conclude hearings this week.

–Washington staff

AVIATION WEEK VOL. 62, NO. 8
FEBRUARY 21, 1955

Aerial Logistics Plan Takes Big Step . . .

USAF Asks Airline Bids for Global Airlift

- **Thirty scheduled and nonscheduled carriers compete for roles in network to overseas and Alaskan depots.**
- **Length of commercial transport operations is indefinite: One Air Force faction seeking purely military system.**

By G. J. McAllister

Air Force's plan for a global aerial logistics system moved a long step forward last week.

Bid invitations went out from Air Materiel Command to a list of 30 scheduled and nonscheduled commercial airlines to provide scheduled airlift of engines from three USAF Air Materiel Area bases in the United States to depots in England, France, French Morocco, Japan, Alaska and Greenland.

▶ **MATS to Direct**—Approximately 10 DC-4s, or their lift equivalent, will be involved initially. Between 40 and 50 four-engine transports eventually will be used with a few aircraft being added each month. Service is expected to start in 30 to 60 days.

The first contracts, to be let on a per plane-mile basis, will be for a three-month period. Other contracts will be on a similar short-term basis.

Commercial aircraft are being used now because the Military Air Transport Service is not able at this time to satisfy the airlift requirement. Some MATS aircraft will be used in the scheduled service, and the entire operation will be performed under the direction of MATS.

▶ **Support Plan**—Air Materiel Areas involved are Oklahoma City (Tinker AFB), Okla.; San Bernardino (Norton AFB), Calif., and Wright-Patterson AFB, Ohio.

Here is how the support function will work:

- **Wright-Patterson** will support overseas depots at Burtonwood, England; Chateauroux, France, and Nouasseur, French Morocco. Burtonwood is the northern AMA for Air Materiel Force in Europe; Chateauroux is the central AMA and Nouasseur is the southern AMA.
- **Oklahoma City AMA** will support Ladd AFB, Alaska, and Thule Air Base, Greenland.
- **San Bernardino** AMA will support Tachikawa, Japan, principal depot for the Far East Air Forces.

Frequency of flights has not been determined; however, a minimum of 10 flights will be made to Tachikawa Air Base during the three-month period.

▶ **Predictable Rate**—Service will be on a point-to-point basis, directly from the AMA to the overseas depot. It will be sufficiently flexible, however, so that engines can be delivered directly to a using overseas base instead of the depot.

Flights returning from overseas bases will carry engines back to the U.S. for major overhaul.

Engine airlift is being tried first by the Air Force since the flow of powerplants around the pipeline has been in a continuous predictable rate, permitting a positive comparison between the surface and airlift systems.

▶ **Planning Pays Off**—The engines will be shipped on lightweight dollies, replacing the large, heavy and expensive containers necessary for surface transport. Other "hi-value" items, principally electronic equipment, later will be included in the airlift.

The inauguration of USAF's scheduled engine airlift project will be the realization of many months of planning.

Air Logistics

Aviation Week presents a double-barreled exclusive report on USAF's expanding air logistics system in this issue. G. J. McAllister reports from the Pentagon on Air Force plans to begin overseas airlift of engines and other high-value parts using commercial carriers. Claude Witze, writing from Alaska (p. 14), describes one of the first successful USAF attempts to supply its farflung combat units by an aerial pipeline.

Air Force Secretary Harold E. Talbott recently said:

"This project provides a good example of the savings that can be made by the use of air transportation.

". . . We estimate that the time of the engine overhaul cycle will be reduced from 270 days now required by surface transportation to 100 days by air transportation.

"We also estimate that our overall engine requirements will be reduced by about 25% in this operation. A 25% reduction in engine requirements amounts to a good many million dollars when we estimate that a single J65 costs about $75,000, a J47 costs about $50,000 and an R4360 about $78,000," he said.

USAF has been using the commercial airlift for engines domestically for nearly a year. The present domestic system will be used as a feeder from U. S. depots to the three AMAs in the overseas service.

The domestic system, called Logair, is providing five C-46 roundtrips weekly between all of AMC's major depots and its aerial ports of embarkation (Aviation Week Aug. 16, 1954, p. 141).

▶ **Domestic Airlift**—Two nonscheduled airlines are providing the service. They are American Import & Export Co., Miami, Fla., which provides service for the western half of the U.S., and Capitol Airways, Nashville, Tenn., which handles the eastern half.

Prior to the establishment of the Logair service, Project Skyway was started as an engine airlift logistics experiment to haul R4360s from Pratt & Whitney Aircraft's East Hartford, Conn., plant to Convair's B-36 assembly line in Fort Worth, Tex., and units of the Strategic Air Command using B-36s. Slick Airways used a DC-6A for the operation initially, and the project was later taken over by American Import & Export Co. with C-46s.

Project Skyway proved that with centralized traffic movement and payload control it was possible to average nearly 100% payload and costs of 10 cents a ton-mile.

USAF now is building a fleet of turboprop aircraft—the Lockheed C-130, the Douglas C-132 and C-133—to operate over its aerial logistics system of the future.

How AAC Saves Money

STOCK ITEMS

	Number stocked	Reduction
Jan. 1954	373,200	.....
Jan. 1955	279,700	93,500
Jan. 1956	153,200	126,500
Total reduction		220,000

LOCAL PURCHASES

	Items purchased per month	Increase per month	Cost per month	Increase cost per month
Jan. 1954	3,500	....	$ 685,000	$ .....
Jan. 1955	5,200	1,700	996,000	311,000
Jan. 1956	6,500	1,300	1,270,000	274,000
Total increase		3,000		$ 585,000

MONETARY INVENTORY

	Value*	Reduction
Jan. 1954	$133,697,000	$ .....
Jan. 1955	109,539,000	24,158,000
Jan. 1956	90,000,000	19,539,000
Total reduction		$ 43,697,000

* Excluding petroleum & ammunition.

Alaska Airlift Slashes Supply Costs

By Claude Witze

Elmendorf AFB, Alaska—USAF's Alaskan Air Command has in the past year effected economies running into millions of dollars by use of air transportation to reduce supply inventories, eliminate warehouse space, shorten pipelines, conserve personnel and cut shipping costs.

Supplies for Elmendorf, near Anchorage, and Ladd and Eielson Air Force Bases, 265 miles north in the Alaska interior, now are obtained directly from the Ogden (Utah) Air Materiel Area. The Elmendorf depot was closed Jan. 1, 1955.

▶ **45-Day Supply**—This has eliminated storage here of a 120-day supply of 373,200 items valued at $133,697,000. In another year, it is estimated, the inventory will be down to a 45-day supply of 153,200 items distributed among the three bases.

Tied-up capital will be slashed to $90 million, a reduction of $43.7 million. Proportionate savings will be realized in rail and truck shipments, depot processing, transportation time and manpower.

The Alaskan Air Command's operation is a working example of USAF's "Logistic '56 Concept" (AVIATION WEEK Dec. 27, 1954, p. 13). Typical is the Allison J35-33 engine used in the Northrop F-89D Scorpion all-weather interceptor. There are six squadrons of F-89s in the Alaska theater. With supplies tied down to surface transportation, there were 66 engines—enough for 90 days—in depot storage and 44 more en route at all times, a total of 110 power units valued at $58,000 each.

With independent base support direct from the zone of interior (ZI) and utilizing air logistics, there will be only 33 in stock and 11 in transit, a total of 44. This means AAC has released 66 engines for other commands, worth $3.8 million on USAF's record of assets.

▶ **Warehouse in Air**—Activation of the Logistics '56 Concept in the territory was brought about by Maj. Gen. George R. Acheson, AAC commander, who says the use of airlift to move high-value or critical items from the ZI to Alaska is bringing more benefits with experience.

GEN. ACHESON: Faster aerial pipeline.

"A year ago our transportation aerial pipeline from all ZI depots for high-priority cargo averaged 14 days," the Alaskan commander told AVIATION WEEK.

"Right now it is down to eight days and we expect that it will be cut in 1955 to an average of five or six days. At the same time, our surface transportation pipeline is speeding up. From an average of 48 days by vessel and rail we have reduced the travel time to 29 days by employment of trucks and barges. My goal is to keep pushing this down to an average of about 25 days from all depots supporting Alaska," he says.

Fully as enthusiastic over the program as Gen. Acheson is Col. C. M. Anderson, AAC deputy for materiel, who says:

"Do you know where I want my warehouse? I want it on the road and in the air. Dependable and fast transportation—which means full utilization of air logistics—is a lot cheaper than depot space with all of the handling and reshipment that goes with it."

▶ **Economical Repair**—Gen. Acheson's effort started when he assumed command more than two years ago. He says he found "that our logistic support mission was being conducted under the same Army concepts that we employed in World War II. . . . We had supplies and equipment far beyond our needs."

Soon it was discovered that wider use of airlift to Alaska would make it necessary to find some kind of cargo to haul the other way. Here was an opportunity to improve the theater's maintenance program because it was clear that a lot of work was being done in Alaska that could be performed more economically at AMAs in the States.

Working with Gen. E. W. Rawlings, head, USAF's Air Materiel Command, a program was developed under which any equipment that could be readily hauled back to the ZI by air, truck, barge-truck or barge-rail would be evacuated for repairs at depot level.

▶ **Surface Transport Saving**—Repair work in Alaska now is concentrated on radar and stationary ground equipment. In addition, AAC fixes its own crashed aircraft and does modifications and IRAN (inspection and repair as necessary) work on liaison and rotary-wing aircraft.

Col. Anderson makes a strong point of the savings effected in ground transportation, particularly in moving the items brought to Alaska by barge.

The cost of moving general cargo from the Alaskan Gulf ports to Elmendorf averages $1.50 per cwt. From Elmendorf to Ladd AFB the charge is $1.90 per cwt. The total is $3.40. Direct shipment cost from the ports to Ladd is $2.55 per cwt. This does not

take into account the savings in handling and repackaging.

By January of 1956, Col. Anderson estimates, AAC will be saving $84,000 a year on rail and truck shipments and $242,400 a year on depot supply processing.

▶ **Less Storage**—Gen. Acheson points out the 1955 reduction of 93,500 items in Elmendorf stock represents about 14,000 tons of supplies valued at more than $21 million.

"The stock reduction," he says, "cut our storage space requirements by about 1 million square feet. We will keep right on cutting and get rid of another 1¾ million square feet."

Other advantages of the new supply system noted by the general:

• Local purchases have increased. A year ago AAC bought locally about 3,500 items a month at a cost of $685,000. The figure now is 5,200 items a month, worth $996,000. Local purchases are made in Alaska whenever possible, but local merchants frequently cannot compete with stateside prices.

• A year ago Elmendorf AFB had 1,500 persons working in the supply depot. This now is down to 1,150 and will be further reduced, to bring an eventual saving of about $4 million a year in manpower.

• Airlift of high-value and critical items from the ZI to Alaska includes about 22% of the items used by AAC. Dollarwise, their value is about 50% of all the supplies in the system. The high-value items, classed as Category I, are those which cost more than $500.

In operation, the Logistics '56 Concept requires a ZI "feeder service" to get supplies to the mobilization point at McChord AFB., Washington, from which they are airlifted to Alaska. This service operates not only from the Ogden AMA, but from any point where a requisition may require a pickup.

Supplemental Subsidy Cut to $15.2-Million

President Eisenhower has requested a $15.2 million supplemental for fiscal 1955 airline subsidy payments—$17.8 million less than anticipated a year ago.

Civil Aeronautics Board requested a $73-million fiscal 1955 appropriation. Congress voted only $40 million, and CAB said it would be necessary to obtain the remaining $33 million in a later supplemental. In January, the President's budget reported an $18.5-million supplemental subsidy requirement for fiscal 1955.

The two main reasons for the reduction in the subsidy requirement, according to CAB, are: Last December's decision on trans-Atlantic mail rate case and increase of overseas shipments of mail by commercial airlines.

Aircraft Turbine Dispute . . .

Wilson Appoints Jet Policy Group

Latest development in the dispute between Defense Department and Aircraft Industries Assn. over a Defense proposal to standardize aircraft turbine engine development is the appointment of a three-man committee to prepare another directive.

Members of the group, appointed by Defense Secretary Charles E. Wilson, are: Frank D. Newbury, Assistant Secretary of Defense for Applications Engineering, who will be chairman; James H. Smith, Jr., Assistant Secretary of the Navy for Air, and Roger Lewis, Assistant Secretary of the Air Force for Materiel.

▶ **Personal Attention**—Wilson said in a letter to AIA president Adm. D. C. Ramsey that "over the past few years there have been too many engine development projects that have failed completely or have seriously delayed aircraft production." He said he is giving his personal attention to the engine situation because "it needs improvement."

The Secretary's letter was in reply to a heated AIA protest against a proposed Defense Department procurement directive aimed at more standardization in turbine engine development (Aviation Week Jan. 24, p. 18). AIA warned that the new policy would be "catastrophic" and demanded that Wilson meet with an industry committee to discuss the problem.

Wilson declined the invitation, but told AIA he has appointed the committee to prepare a directive, already facing its fifth draft, to assure that future development follows "a longrange plan."

▶ **Standards**—The proposed policy originated in Newbury's office, where it reportedly was written by one of his aides, Floyd T. Hague, director of aircraft and marine craft. Both Newbury and Hague are former top officials of Westinghouse Electric Corp.

In its last version, the policy called for:

• A standard system of thrust ratings set at 6,700, 10,000, 15,000 and 22,500 lb.

• A standard set of engine diameters, ranging from 25 to 45 in.

• Final development, evaluation and manufacture of only one engine out of the designs offered in any class.

Wilson told newsmen he was not surprised at industry opposition because "you usually have some opposition from some sources when you try to do things like this."

He said Defense Department is trying to draw up a basic plan that will improve the chances of success in any engine development program.

▶ **Early Cancelation**—At the same time, industry spokesmen were unshaken in their opposition to the idea. Some of them admit frankly that from time to time there are engine development projects that are continued when they ought to be dropped. Usually, these projects are carried on because substantial money already has been spent trying to launch a new idea. The effort to prevent waste here, however, sometimes results in further large expenditures before the engine is washed out, and an aircraft may go with it.

These men feel that early cancelation of unpromising projects would provide a reasonable remedy for the situation. It would not, as they fear might result from the Newbury directive, restrict competition and leave the armed forces with a single engine in each category. These dangers were pointed out:

• If the future of one weapon system is pinned to the assumed success of a single engine and that engine fails, the entire system will be doomed.

• In the same situation, it will be necessary to start the development project from the beginning again because there is no alternate engine.

• Continuing development projects are essential to any engine plant to keep staff engineering talent available, busy and up to date on powerplants. With a smaller number of projects, development costs will increase.

• The time cycle for engine development probably would increase and tooling would be delayed before actual production could start.

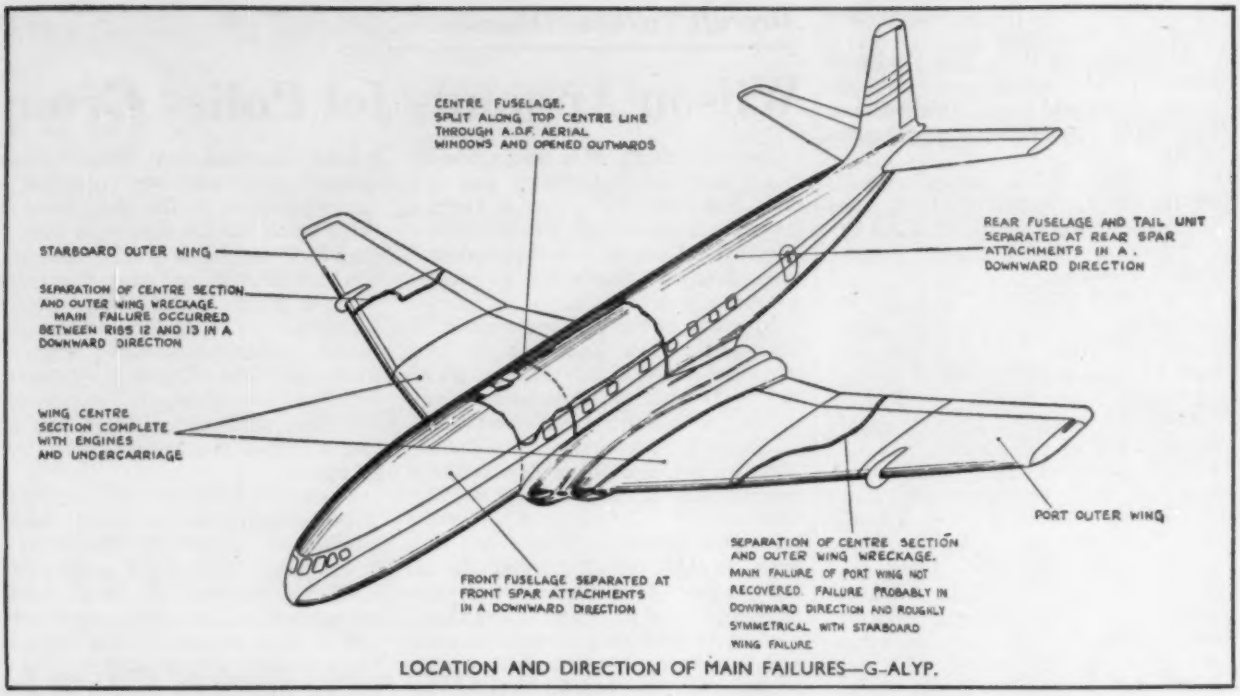
• Advantages inherent in competition—both between manufacturers and between branches of the armed forces—would be lost.

Secretary Wilson did not specify which engines, airplanes or manufacturers he had in mind when he told Adm. Ramsey there have been too many failures.

Last November the Navy canceled $372 million in contracts for two types of aircraft, naming the J46 and J71-A-2 engines as power units which had not developed as fast as expected. They are manufactured by Westinghouse and the Allison Division of General Motors.

Olympus Altitude Tests

Bristol Olympus turbojets, have started high-altitude research trials on an Avro Ashton flying test bed. Two Olympus engines are mounted in pods outboard of the Ashton's normal power installation of four Rolls-Royce Nene jets.


CENTRE FUSELAGE. SPLIT ALONG TOP CENTRE LINE THROUGH A.D.F. AERIAL WINDOWS AND OPENED OUTWARDS
STARBOARD OUTER WING
SEPARATION OF CENTRE SECTION AND OUTER WING WRECKAGE. MAIN FAILURE OCCURRED BETWEEN RIBS 12 AND 13 IN A DOWNWARD DIRECTION
WING CENTRE SECTION COMPLETE WITH ENGINES AND UNDERCARRIAGE
REAR FUSELAGE AND TAIL UNIT SEPARATED AT REAR SPAR ATTACHMENTS IN A DOWNWARD DIRECTION
PORT OUTER WING
FRONT FUSELAGE SEPARATED AT FRONT SPAR ATTACHMENTS IN A DOWNWARD DIRECTION
SEPARATION OF CENTRE SECTION AND OUTER WING WRECKAGE. MAIN FAILURE OF PORT WING NOT RECOVERED. FAILURE PROBABLY IN DOWNWARD DIRECTION AND ROUGHLY SYMMETRICAL WITH STARBOARD WING FAILURE
LOCATION AND DIRECTION OF MAIN FAILURES—G-ALYP.

Comet Verdict Upholds RAE Findings

Final verdict of the Comet court of inquiry unhesitatingly backed the deduction of Britain's Royal Aircraft Establishment: The accident to de Havilland Comet G-ALYP off Elba Jan. 10, 1954, was caused by structural failure of the cabin brought on by fatigue.

Lacking positive evidence for the accident to G-ALYY near Naples Apr. 8, the court was willing to accept the RAE thesis as a possible cause.

Beyond that, no specific responsibility was fixed and no blame attached to any parties. RAE was right, and nobody was wrong. But some detailed tightening of test and design procedures was needed for future British aircraft.

Thus did Lord Cohen, sitting in final judgment on the aftermath of tragedy, summarize the findings of the 22-day hearing.

▶ **For the Future**—Initial recommendations made by Lord Cohen to avoid similar accidents in the future were:

• **Securing an economically satisfactory** safe life of a pressure cabin by more study in design and experiment.

• **Guarantee that pressure cabins** will be entirely safe by devising methods for design and test programs to that end.

• **Determine stress distribution** and fatigue life by calculation and test of cabin components and complete cabins. This probably means testing two complete cabins.

• **Use existing methods** of calculation for stress distribution more widely, and verify or amend these with extensive strain gauge tests.

▶ **Next steps**—But there are still research roads to explore, said Lord Cohen, in recommending three possible areas for investigation.

First is the influence of ductility of aluminum alloys on stress distribution. Because of stress variation from cutouts or other stress raisers, the loading in the skin of a pressure cabin will not be uniform. As pressure is increased, stress in localized areas may pass the elastic limit of the metal. On relief of pressure, the metal will stay stretched, and the stress concentration will be relieved. This pheonomenon has to be understood more completely.

Return Comets

Royal Canadian Air Force's two de Havilland Comet 1A jet transports are expected to be shipped back to the manufacturer in Great Britain for rebuilding.

The two planes cost RCAF $4 million, with spare parts. They have been grounded since early last year pending outcome of the British Board of Inquiry into the two Comet crashes at Rome.

Ottawa sources say de Havilland has offered to rebuild the two Comets completely—either for maximum altitudes and speeds or for limited use.

RCAF had used the Comets in its transport operations before grounding.

Second is the true static strength of the Comet cabin. There are reasons for believing that tests made only on a portion of the cabin were misleading. Therefore, said Lord Cohen, "A test conducted in the tank at RAE, with the most comprehensive exploration of the stress distribution, would be invaluable."

Third is the Comet control system. Subject of some controversy and more opinion, Lord Cohen said the control system of the Comet deserves reconsideration from two angles: Reduction of "break-out" force and incorporation of positive feel.

▶ **Clean Bill**—De Havilland engineers were not blamed by the findings; the company was ". . . proceeding with what was then regarded as good engineering practice."

A list of proposed changes in Comet design was submitted to the court during the inquiry, and de Havilland publicly stated the steps it is taking to modify the Comet 2.

After the release of the court report, de Havilland offered its congratulations on the fairness and clarity of the procedure. "Careful note will be taken of the findings and the recommendations made," the company said.

There was no fault to find with the present system of in-factory inspection, done by the manufacturer and supervised by the Air Registration Board.

▶ **ARB Views**—During the hearing, Sir Lionel Heald, representing H. M. Attorney General, listed the practical steps

proposed by the Air Registration Board to tighten some of the procedures in design and operation of future aircraft.

The board recommended complete cabin tank tests of future airliners, similar to the ones done at RAE. Two prototype airframes also will have to be tested—one statically and the other for fatigue. There is some technical opinion strongly against the tank tests. One specific objection has been that electrolytic action between steel tank and aluminum structure produces deterioration.

The board proposed the addition of one or more members "specially selected for their eminence in the scientific field." One already has been appointed.

The value of fully instrumented flights on proposed routes with the new aircraft was underscored, as was the importance of fatigue research.

Lord Cohen disagreed with one suggestion that an active pilot be appointed to ARB because, in effect, he would not be able to continue as an active pilot and spend adequate time on ARB problems. Lord Cohen further suggested that in the future more use be made of the flight test facilities of the Ministry of Supply.

"When these measures have been applied and the test completed," said Lord Cohen after making his first recommendation, "de Havilland will no doubt ask ARB to recommend the grant of a certificate of airworthiness to the redesigned Comet. . . . I may perhaps express the hope that this procedure will reassure the public as to the integrity of pressure cabins and will justify Sir Arnold Hall's confidence that the Comet aircraft will fly again."

NAA Gets $5-Million Contract for F-86F

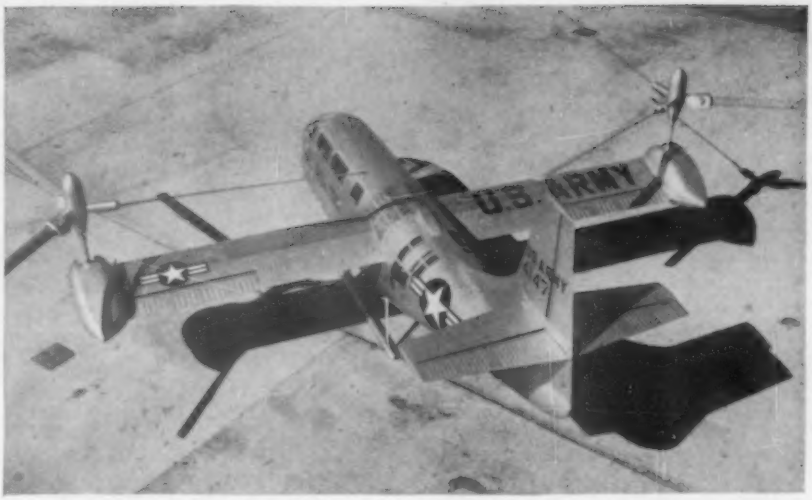
A $5-million contract for F-86F Sabre jet fighters for Mutual Defense Assistance Pact nations has been awarded to North American Aviation, Inc.

The manufacturer says procurement of long leadtime items needed to fill the order has been started at the Los Angeles plant. Planes will have some minor improvements over the earlier F-86Fs and still will be powered by the General Electric J47-27 engine. The F-86F has been out of production since May 1954.

Other Air Materiel Command contracts disclosed by the Department of Commerce include:

General Electric Co., Cincinnati, tailcone and afterburner assemblies, $314,100.

Northrop Aircraft, Inc., Anaheim, Calif., photographic window panes, $305,356.



XV-3 PROCUREMENT will begin sometime in 1956, if Army convertiplane meets spec.

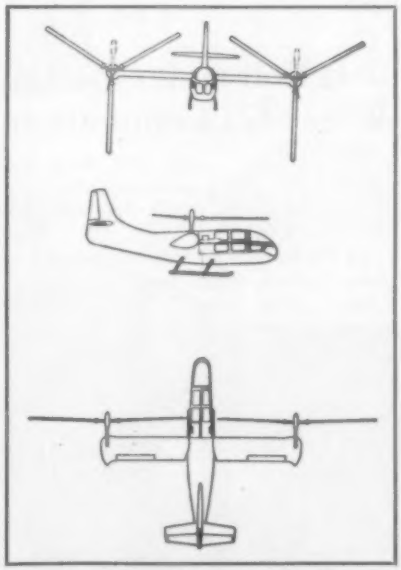
Bell XV-3 to Probe Convertibility

By David A. Anderton

Ft. Worth—Bell Aircraft Corp.'s XV-3 convertiplane, shown publicly for the first time last week, joins the jet-powered VTO test vehicle as the company's second contribution to the solution of vertical-flight problems.

The XV-3 is the second tangible result of the Army's interest in the new category of aircraft. First was McDonnell Aircraft Corp.'s XV-1 (Aviation Week Feb. 15, 1954, p. 17). The XV-2, a Sikorsky design featuring a single-bladed rotor that could be stopped for forward flight, never was carried beyond the design stage.

► **Explorer**—Primary purpose of the XV-3 design is to probe the areas of possible usefulness for the configuration. The Army considers the convertiplane as a tactical vehicle for observation, reconnaissance, evacuation, rescue and liaison, and sees future possibilities in cargo and assault transports.



BELL XV-3 three-view reveals layout.

Reason for a convertiplane is to combine the better characteristics of the helicopter and the airplane. Speed range is from hovering to an estimated 175 mph., somewhat faster than the fastest current helicopter mark.

Wingtip rotors of the XV-3 provide lift and propulsion. In the horizontal plane, all their force is direct lift. When the convertiplane is off the ground, the rotors are tilted forward and lift is converted into thrust for forward flight.

The rotors are tilted with electric motors in the nacelles at the wingtips. The operation takes about 10 seconds, can be stopped or reversed anywhere along the way, and can be done in level flight, climb or dive.

► **XV-3 Details**—The Bell convertiplane is a sleek, silvery aircraft with 24-ft. diameter all-metal bonded rotors mounted at the tips of a 30-ft. span wing. Overall length is 30 ft. With rotor mast vertical, the height is 13 ft. Power comes from a Pratt & Whitney R985 radial piston engine, mounted in a bay at the wing.

Wing chord is small, although total area is enough to carry the XV-3 in forward flight. One reason for minimizing wing area is to reduce the blanketing and reflecting surface placed immediately below the rotor disk. Both McDonnell and Sikorsky are reported to be having difficulties with the reflected flow from the large lifting area under the rotors of the XV-1 and the S-56.

Leading edge of the wing is hinged on the lower surface for access to the drive shafts. Conventional ailerons are fitted for lateral control. Inboard root

Sncase to Take Over Breguet

(McGraw-Hill World News)

PARIS—Societe Louis Breguet shortly will be taken over by the government-owned Societe Nationale de Constructions Aeronautiques du Sud-Est (Sncase), a merger that threatens to touch off an investigation of financial operations of the nationalized sector of France's aircraft industry.

Gen. Pierre Koenig, a deputy of the French National Assembly, asked the government to open an inquiry into the comparative financial treatment accorded to Breguet, Sncase and its sister company, Societe Nationale de Constructions Aeronautiques du Sud-Ouest (Sncaso), in their production of transport aircraft.

Brequet ran into serious financial trouble with the production of the "Deux Ponts" 763, now flown by Air France under the name "Provence." Production of the plane was suspended after total output of only 15 aircraft, including prototypes. Breguet's losses on the operation are said to be about $5,570,000.

It has been reported, although never confirmed, that the company had been given assurance of a longer series production for the plane—at least 24, presumably to be used by Air France or the French air force.

The "Deux Ponts," a four-engine transport capable of carrying 107 passengers, found no buyers abroad despite considerable efforts by the manufacturer and the French government.

What attracted Koenig's attention is the fact that neither of France's other major efforts at building transports since the war has been much of a success. Sncase's "Armagnac" and Sncaso's "Bretagne" failed to find favor with airline operators.

Koenig's question is simple: Did the government use the same system of payments for all three planes? Or did the nationalized companies get special treatment?

Regardless of the outcome of the inquiry, there is little doubt that the Breguet collapse is indicative only of the weak position of French aircraft producers. The internal market, both military and civilian, is insufficient to support the industry on its present scale. (Two-thirds of the industry already is in government hands.)

Apart from some relatively minor sales of military planes to India and in Latin America, French aircraft have not attracted foreign buyers.

Overall aircraft production in France, measured in metric tons of airframe weight, was 925 tons in 1954 against 1,608 in 1953. The total number of individual aircraft produced fell from 600 in 1953 to 401 in 1954.

section carries a small flap-like surface.

Fuel capacity is 100 gallons of 91-96 grade gasoline.

▶ **Demonstration**—Unveiling of the XV-3 was the dramatic highspot of a one-day visit by top Pentagon officials, headed by Frank H. Higgins, Assistant Secretary of the Army for Logistics, Research and Development. But record cold and a driving wind forced the rollout to be an unveiling inside the Bell experimental flight test hangar at their Hurst Plant near Ft. Worth.

The XV-3 was trestled off the floor in a level flight attitude behind a green curtain screening it from the audience of Army, Navy and Air Force officers plus representatives of the industry and press. While project engineer Robert Lichten explained some of the principles behind the design, the curtain was opened on the XV-3.

▶ **Next Stop**—Tie-down tests are the next scheduled event in the XV-3 program. These will precede flight tests, estimated to occupy the better part of one year. Procurement of the craft, assuming it meets performance demands, will begin sometime in 1956, say some Army officials.

Exhibition of the XV-3 followed a tour of Bell's helicopter facility at Hurst. One of four plants in the vicinity operated by Bell, the principal product at Hurst is the Navy's HSL anti-submarine copter. The entire assembly floor is filled with that copter. Bell's Model 47 and its variants are made in the former Globe aircraft plant, now operated by Bell.

Bell Helicopter Design Wins Stiff Competition

Bell Aircraft Corp. last week was selected over seven other manufacturers to develop a new utility helicopter for the U. S. Army.

In the hottest aircraft competition of Army history, a year-long race that attracted more industry attention than many Air Force and Navy design efforts, Bell was awarded a contract for preliminary engineering and a mockup.

▶ **Model 212**—The helicopter will have a payload of 800 lb. Cruising speed will be 100 knots; hovering ceiling is 6,000 ft. and rate of climb 1,500 ft. per minute. It will be used for evacuation of wounded, utility missions and as an instrument trainer.

Until it is given a military designation, the new machine will be called by its Bell designation, Model 212. It is a single rotor configuration, similar to the Bell 47G-1 but slightly larger. The 47G-1 is a four-place helicopter demonstrated to the military late last summer (Aviation Week Sept. 13, 1954, p. 17).

Performance specifications of the 47G-1, of which only one model was built for demonstration purposes, are similar to those of the new 212. It has a gross load of 2,550 lb., service ceiling of 16,000 ft. When it was shown to the military, Bell officials said they also were sounding out the commercial market for an aircraft of this type.

▶ **Proven Parts**—In the military helicopter family, the new 212 will fall between the Bell H-13 (Model 47) and the Sikorsky H-19 (S-55). Both of these aircraft saw service in Korea. The H-13 was small for evacuation missions and limited in performance in some parts of the theater where altitudes ranged from 3,000 to 8,000 ft. The H-19 is larger and heavier than the new Bell 212 and presumably more expensive to operate.

Additional economy feature probably is the incorporation of some proven dynamic parts of the familiar Model 47 into the new 212. Bell has built more than 1,000 of the smaller aircraft. The Army in the past year, while the competition was under way, has given increasing emphasis to the importance of reduced maintenance costs.

Inclusion of instrument training as one of the Army missions for the new model indicates that the company has made substantial progress in development of blind flying methods. Army aviation officials have surveyed the Bell program in this field and have been given up-to-date information on the status of its development.

▶ **Eight Proposals**—Keen interest in the utility copter competition, started a year ago, was evidenced by designs from eight manufacturers. Some of them, including Bell, submitted more than one proposal. All entrants worked under high pressure to meet Army deadlines.

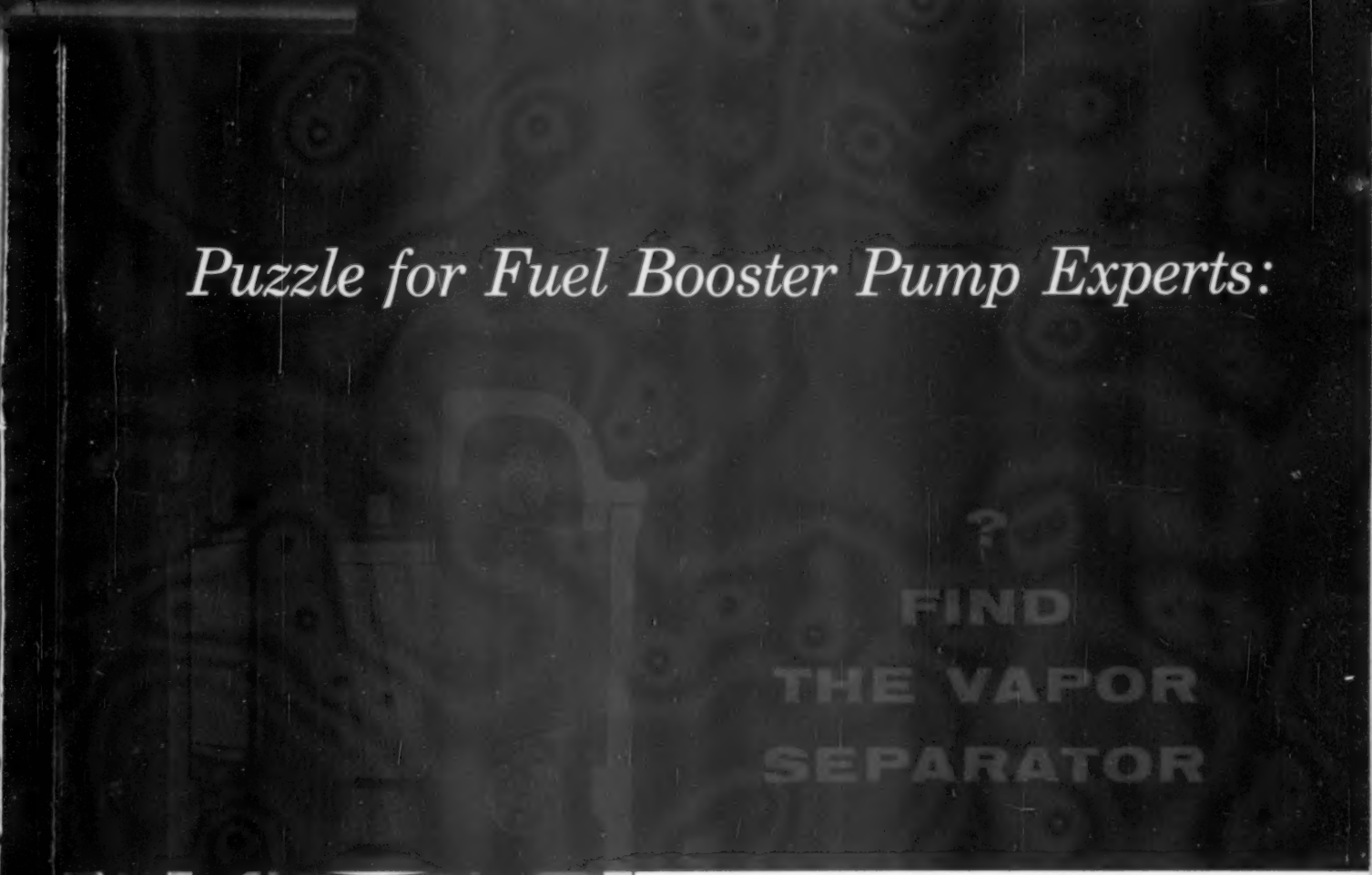
First evaluation of the proposals was made by USAF, which acts as a purchasing agent for the Army. Final announcement of Bell's selection was made by the Department of Defense.

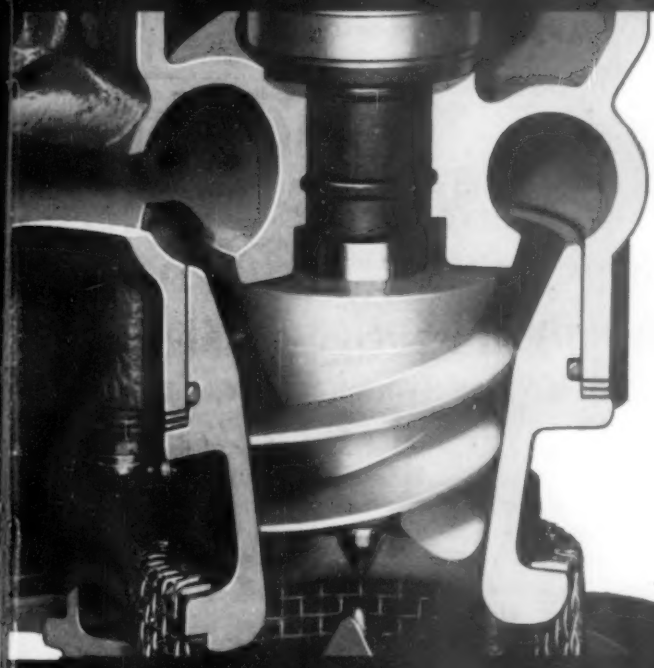
There has been no indication of how many Model 212 helicopters will be needed by the Army. Current plans call for procurement only of a limited number for test and evaluation, but the industry is known to anticipate big demands for a helicopter of this type.

Limited payload capacity of smaller helicopters and high cost of larger ones are factors in favor of the new design.

The 212 will be built at Bell's Helicopter Division plant near Ft. Worth, Tex., where the Army recently rolled out its second convertiplane, the XV-3 (Aviation Week Feb. 14, p. 15).

Puzzle for Fuel Booster Pump Experts:





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All these advantages stem from the fact that the HY-V/L* design completely eliminates the old vapor separator used in conventional fuel booster pumps. This is done by compressing the fuel vapors back into the liquid *inside the pump.*

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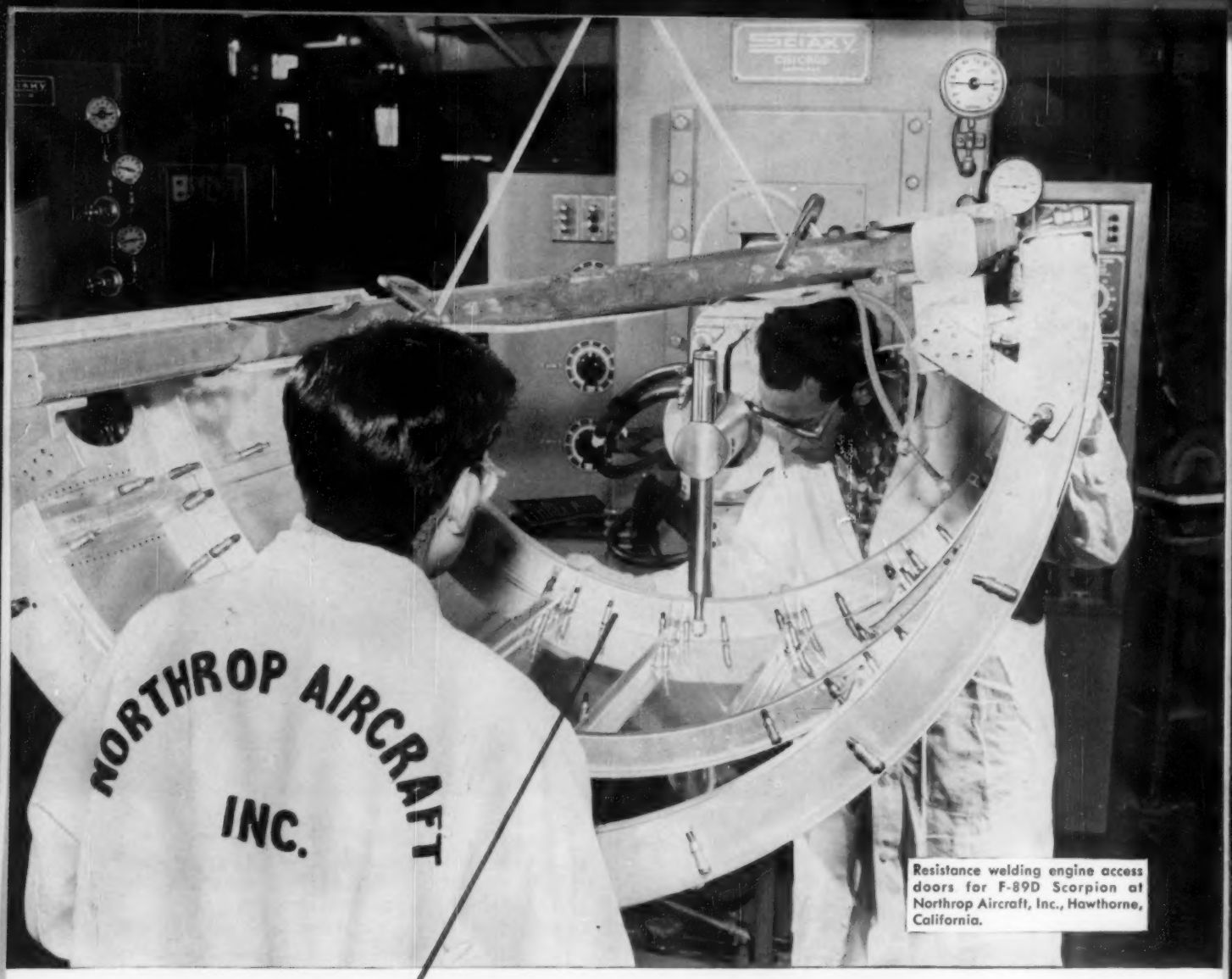

Resistance welding engine access doors for F-89D Scorpion at Northrop Aircraft, Inc., Hawthorne, California.

Primary Structures Prove Quality, Dependability of Resistance Welding

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The USAF Northrop F-89D Scorpion, America's most heavily armed fighter type aircraft, is dramatic proof of the quality and dependability of Sciaky patented Three-Phase resistance welding. Such primary structures as engine access doors, keel, skin, wing tanks, and main landing gear doors are completely resistance welded. Almost all other assemblies are partially resistance welded. Write for the complete story of "Resistance Welding At Work" on the F-89D contained in Vol. 4, No. 4, and Vol. 3, No. 6.

Northrop's full acceptance of resistance welding is based on many years' experience—the 1933 experimental flying laboratory "Gamma" with spot welded wing skin proved weld integrity . . . the World War II P 61 Black Widow with spot welded twin tail booms proved impressive production economy of 60% over riveting . . .

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Link to Build New Pilot Trainer

Flight Safety, Inc., independent training organization for business and airline pilots, has entered into a contract with Link Aviation, Inc., for design and production of the first twin-engine, two-place procedures and navigational flight trainer sold for commercial use.

Both companies emphasize that the unit will be a flight "trainer," as distinct from a simulator.

Acquisition of the trainer will be one more step in an overall expansion program that has seen Flight Safety grow from a refresher training organization for business pilots and pilots of medium-size airlines into a firm offering not only training but also a comprehensive advisory and consultation service designed to help corporations in the selection, operation and maintenance of aircraft (AVIATION WEEK Oct. 18, 1954, p. 87).

▶ **'Flight Translator'**—The new trainer, designated by Link as the E-600, will be called a "flight translator" by Flight Safety. Delivery is expected the latter part of this year or early 1956. The unit will be used in the firm's advanced training programs for pilots.

Specifications for the trainer are the result of a joint effort on the part of both companies. It is to be of side-by-side cockpit configuration. The two firms claim it will have the most complete radio aids simulation of any flight trainer or simulator known.

The Link unit will simulate the two complete and independent powerplants found in a typical twin-engine aircraft. Each simulated engine will operate as an entity in itself and will have its own complete set of instruments and controls. Link says this feature makes possible the simulation of asymmetrical engine operation and its effects.

▶ **E-600 Features**—Both companies say their contract represents the first commercial sales in the U. S. of a flight trainer incorporating a DC computer system. Link has pioneered such use of a DC system in its latest simulators being produced for Air Force. Other advantages cited are:

- Complete radio facilities provide for precise simulation of the complex radio problems and situations with which pilots are confronted.
- Pilots can receive up to four radio stations simultaneously in the translator, making possible a thorough pilot drill on radio aids and procedures—including approaches, letdowns and latest air traffic control procedures.

Included in the radio equipment to be provided in the unit are: two ADF low-frequency and two ILS-VOR receivers; marker beacon receiver, two VHF receivers, HF transceiver; isolation amplifier; interphone, and master control panel.

The four transmitting stations can provide any combination of broadcast,

Civil Plane Shipments Increase 21%

Shipments of civilian aircraft in November increased 21% over October as measured by airframe weight, Commerce Department reports. The total for November was 699,200 lb.

Unfilled orders for civil planes weighing 3,000 lb. or more amounted to 234 at the end of November, 7% less than the October backlog.

	November 1954	October	November 1953
Completed aircraft	288	174	275
By weight of airframe			
Less than 3,000 lb.	265	155	247
3,000 lb. and more	23	19	28
By number of places			
1 to 5 place	258	147	247
More than 5 places	30	27	28
By total hp., all engines			
Up to 339 hp.	256	145	247
400 hp. and more	32	29	28
Total value of completed parts (000 omitted)	$24,895	$25,409	$38,022
Aircraft	18,589	16,849	29,308
Less than 3,000 lb.	3,503	3,194	2,311
Aircraft parts	6,306	8,560	8,714
Total of aircraft engines and parts (000 omitted)	$12,337	$11,867	$14,296
Aircraft engines	5,389	4,811	7,171
Engine parts	6,948	7,056	7,125

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▶**Unit Flexibility**—Flight Safety says flexibility in the unit's use is insured by its simulation of instrument flight conditions, engine operation, performance, stability and control pressures of a modern twin-engine aircraft.

Overall design includes a cockpit section, an operator's or instructor's panel and steel cabinets housing the computer mechanisms. The two-place cockpit will contain all of the normal flight instruments—both for pilot and co-pilot—with a complete set of engine instruments on the instrument panel.

The instructor's or operator's area, located immediately behind the cockpit, will include all controls necessary to set up a training "flight" to any part of the globe and to make necessary adjustments and settings during any portion of the "flight."

In addition to these facilities, the unit will be equipped to train crews to cope with emergency situations, such as partial or complete power failure, engine fire, radio or instrument failures, wing icing and many others. The instructor will be able to introduce such hazards at any time during a training flight and, through warning lights on his panel, tell whether the crew performed correct remedial actions.

▶**Civil, Military News**—According to Link president E. Allan Williford, the trainer meets a "long-expressed desire by both commercial and military aviation for a high-performance, twin-engine trainer with simulator quality but of sufficiently flexible performance to be used as a general trainer."

"Also, most important," adds Flight Safety president A. L. Ueltschi, "the translator will make a substantial contribution to the future of safety in the air."

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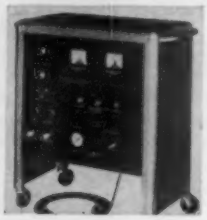

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Three TWA Officials Sell 4,100 Shares

Disposal of 4,100 common shares of Trans World Airlines stock by three officers and directors of the company is reported by Securities and Exchange Commission.

The TWA transactions:

Warren L. Pierson, chairman of the board, disposal of 3,000 shares, leaving a holding of 2,990; Ralph S. Damon, president and director, disposal of 1,000 shares, leaving a holding of 1,690; John L. Weller, vice president, disposal of 100 shares, leaving a holding of 60; acquisition of 537 shares by E. C. Cocke, vice president and director, making a holding of 2,124 shares was also reported.

Other transactions reported in SEC's report for the mid-December to mid-January period:

Aero Supply Mfg. Co. Disposal of 1,400 common shares by Leo Strauss, director, leaving a total holding of 7,493.

Air Associates, Inc. Acquisition of 100 common shares by C. Kenneth Baxter, director, making a total holding of 100; acquisition of 300 common shares by Donner Trusts, making a total holding of 167,772.

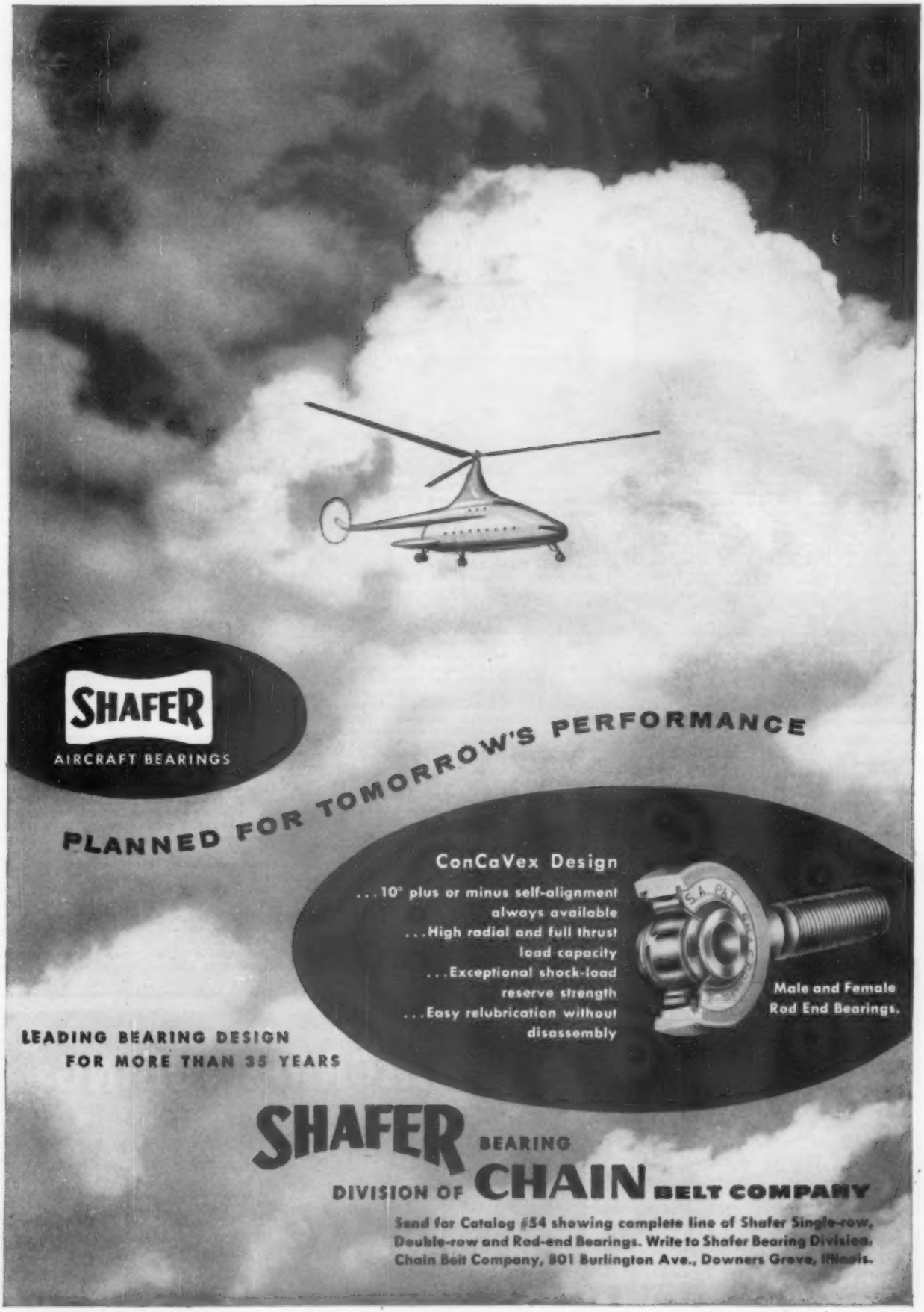
Alaska Airlines, Inc. Disposal of 4,600 common shares by Frank C. LaGrange, director, leaving a total holding of 2,900; acquisition of 900 common shares by Paul C. Taylor, director, making a total holding of 7,600.

American Airlines, Inc. Acquisition of 200 common shares by James W. Aston, director, making a total holding of 300; disposal of 400 common shares by A. R. Bone, Jr., officer, leaving a total holding of 1,600; disposal of 100 common shares by W. Nelson Bump, officer, leaving a total holding of 1,000; acquisition of 4,450 common shares through exercise of option by R. E. S. Deichler, officer, making a total holding of 5,000; acquisition of 1,500 common shares through exercise of option by Theodore P. Gould, officer, making a total holding of 1,600; disposal of 250 common shares by Stanley G. King, officer, leaving a total holding of 2,000; acquisition of 5,000 common shares through exercise of option by William Littlewood, officer, making a total holding of 6,000 and an indirect holding of 1,020.

Beech Aircraft Corp. Disposal of 1,822 common shares by Olive Ann Beech, officer and director, leaving a total direct holding of 62,000 and an indirect holding of 45,170.

Bell Aircraft Corp. Acquisition of 100 common shares and disposal of 200 common shares by G. B. Clark, officer, leaving a total holding of 100; acquisition of 240,000 common shares by Equity Corp., making a total holding of 1,301,466.

Braniff Airways, Inc. Acquisition of 5,000 common shares by C. G. Adams, officer and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director, making a total holding of 6,900; acquisition of 5,000 common shares by Charles E. Beard, officer and director, making a total holding of 8,000; acquisition of 200 common shares by Eugene C. Eppley, director, making a total holding of 6,100; acquisition of 5,000 common shares by R. C. Shrader, officer and director, making a total holding of 20,005; acquisition of 3½ pc convertible debentures at $1,000 by James W. Austin, officer, making a total holding of $1,000.

Cessna Aircraft Co. Disposal of 900 common shares by Getto McDonald, director, leaving a total holding of 5,800; disposal of 200 common shares by Dwane L. Wallace, officer and director, leaving a total holding of 67,050.

Chance Vought Aircraft. Acquisition of 100 common shares by Frederick O. Detweiler, officer and director, making a total holding of 1,137.

Colonial Airlines, Inc. Disposal of 100 common shares by L. Orville Cameron, officer, leaving a total holding of 400.

Continental Air Lines, Inc. Acquisition of 300 common shares by Oscar R. Haueter, officer, making a total holding of 1,063; acquisition of 300 common shares by S. B. Redmond, officer, making a total holding of 475.

Curtiss-Wright Corp. Acquisition of 100 common shares by Frank H. Hankins, Jr., officer, making a total holding of 200.

Eastern Air Lines, Inc. Acquisition of 1,000 common shares by George B. Howell, director, making a total holding of 1,500; acquisition of 2,000 common shares and disposal of 3,500 common shares by E. V. Rickenbacker, officer and director, leaving a total holding of 102,050.

Emerson Electric Mfg. Co. Acquisition of 100 common shares by Mills, Inc., making a total holding of 83,000.

Flying Tiger Line, Inc. Acquisition of 1,300 common shares by Robert W. Prescott, officer and director, making a total holding of 2,528.

General Dynamics Corp. Acquisition of 5,591 common shares by Ellsworth C. Alvord, director, making a total indirect holding of 8,216 and a direct holding of 537; acquisition of 210 common shares by Lambert J. Gross, officer and director, making a total indirect holding of 210 and direct holding of 2,057; acquisition of 20,000 common shares through exercise of option by John Jay Hopkins, officer and director, making a total holding of 31,218; disposal of 5,325 preferred shares by Ellsworth C. Alvord, director, his total holding; disposal of 200 preferred shares by Lambert J. Gross, officer and director, his total holding.

General Electric Co. Disposal of 273 common shares by Willard H. Sahloff, officer, leaving a total holding of 2,010; acquisition of 1,125 common shares by Clarence C. Walker, officer, making a total holding of 1,728.

General Motors Corp. Disposal of 1,400 common shares by Donaldson Brown, director, leaving a total indirect holding of 109,876 and a direct holding of 26,878.

Hazeltine Corp. Disposal of 1,000 common shares by F. Robinson, director, leaving a total holding of 400.

Lear, Inc. Disposal of 3,000 common shares by Philip E. Golde, officer, leaving a total holding of 7,237; disposal of 1,000 common shares by H. R. Campbell, officer, tor, leaving a total holding of 407,424.

Lockheed Aircraft Corp. Disposal of 1,000 common shares by H. R. Campbell, officer, leaving a total holding of 2,150.

Glenn L. Martin Co. Disposal of 200 common shares by estate of Duncan M. Spencer, director, leaving a total indirect holding of 1,800.

Minneapolis-Honeywell Regulator Co. Disposal of 100 common shares by C. D. Lyford, officer, his total holding; acquisition of 400 common shares by T. McDonald, officer and director, making a total holding of 1,400.

National Aviation Corp. Acquisition of 500 common shares by Frederick F. Robinson, officer, making a total holding of 500; acquisition of 200 common shares by Marjorie E. Tindall, officer, making a total holding of 200.

Northrop Aircraft, Inc. Disposal of 300 common shares by Kenneth P. Bowen, officer, leaving a total holding of 3,692; disposal of 9,500 common shares by Whitley C. Collins, officer and director, leaving a total holding of 11,996; disposal of 6,000 common shares by William B. Collins, director, leaving a total holding of 20,000; acquisition of 1,320 common shares through exercise of option by Edgar Schmued, officer, making a total holding of 3,960.

Northwest Airlines, Inc. Disposal of 100 common shares by A. E. Floan, officer, leaving a total holding of 5.

Pan American World Airways, Inc. Acquisition of 114 capital shares through compensation by Russell B. Adams, officer, making a total holding of 540; acquisition of 209 capital shares through compensation by Erwin Balluder, officer, making a total holding of 15,485; acquisition of 285 capital shares through compensation by Henry J. Friendly, officer and director, making a total holding of 3,855; acquisition of 266 capital shares through compensation by Harold E. Gray, officer, making a total holding of 2,314; acquisition of 285 capital shares through compensation by John C. Leslie, officer and director, making a total holding of 1,394; acquisition of 285 capital shares through compensation by Samuel F. Pryor, officer and director, making a total holding of 6,357; acquisition of 171 capital shares through compensation by John S. Woodbridge, officer, making a total holding of 671.

Piper Aircraft Corp. Acquisition of 600 common shares and disposal of 600 common shares by W. T. Piper, officer and director, leaving a total direct holding of 136,956 and an indirect holding of 140,000; acquisition of 460 preferred shares by W. T. Piper, officer and director, making a total holding of 920.

Raytheon Mfg. Co. Disposal of 1,000 common shares by Charles M. Hofman, officer, leaving a total direct holding of 2,560 and an indirect holding of 2,009; acquisition of 1,400 common shares by Harold C. Mattes, officer, making a total holding of 15,534.

Republic Aviation Corp. Acquisition of 121 common shares through stock dividend

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SINCE 1907, FABRICATORS OF METAL AIRCRAFT ASSEMBLIES AND ARCHITECTURAL PRODUCTS

by John J. Ryan, officer, and disposal of 100 common shares leaving a total holding of 1,231.

Rohr Aircraft Corp. Disposal of 1,800 common shares by J. E. Rheim, officer and director, leaving a total holding of 31,335; disposal of 1,800 common shares by Fred H. Rohr, officer and director, leaving a total holding of 44,945.

Ryan Aeronautical Co. Acquisition of 200 common shares by Emtor Inc., making a total holding of 86,800; disposal of 500 common shares by Earl D. Prudden, officer and director, leaving a total holding of 5,000.

Seaboard & Western Airlines, Inc. Disposal of 100 common shares by Samuel I. Fondiler, officer, leaving a total holding of 225; disposal of 500 common shares by Harold Montee, officer, leaving a total holding of 11,576; disposal of 300 common shares by Wallace P. Neth, officer and director, leaving a total indirect holding of 27,749 and a direct holding of 426; disposal of 5,100 common shares by Raymond A. Norden, officer and director, leaving a total holding of 28,537; disposal of 375 common shares by Warren H. Renninger, officer, leaving a total holding of 13,250.

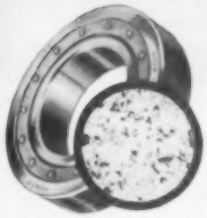
Sperry Corp. Disposal of 1,000 common shares by Norman B. Frost, director, leaving a total holding of 1,000; disposal of 2,500 common shares by H. F. Vickers, officer, leaving a total holding of 38,300.

United Aircraft Corp. Disposal of 500 common shares by Bernard L. Whelan, officer, leaving a total holding of 1,500.

Westinghouse Electric Corp. Disposal of 500 common shares by Walter J. Maytham, Jr., officer, leaving a total holding of 127; acquisition of 2,500 common shares by John M. Schiff, director, making a total holding of 10,000; acquisition of 1,500 common shares through exercise of option by Harry E. Seim, officer, making a total holding of 2,944; disposal of 300 common shares by C. S. Weber, officer, leaving a total holding of 582.

Lord Hives Visits U.S.

Lord H. S. Hives, Rolls-Royce executive chairman (left) views a target drone aircraft at the plant of Radioplane Co., Van Nuys, during a tour of southern California aircraft facilities. Here Whitley C. Collins, president of Radioplane and its parent firm, Northrop Aircraft, Inc., explains the drone's features. The men also discussed the new 1,810-lb.-thrust Rolls Soar jet which Radioplane will use in an upcoming supersonic target drone being developed for USAF. (Aviation Week Oct. 11, 1954, p. 11).



THE SECRET of this extraordinary new bearing is the ability of its porous sintered bronze cage to retain many hours' reserve supply of oil. Each tiny interstice acts as a life-saving "oil well" which prevents bearing failure even when all outside lubrication has been interrupted for hours at the tremendously high rpm's developed by jet engines.

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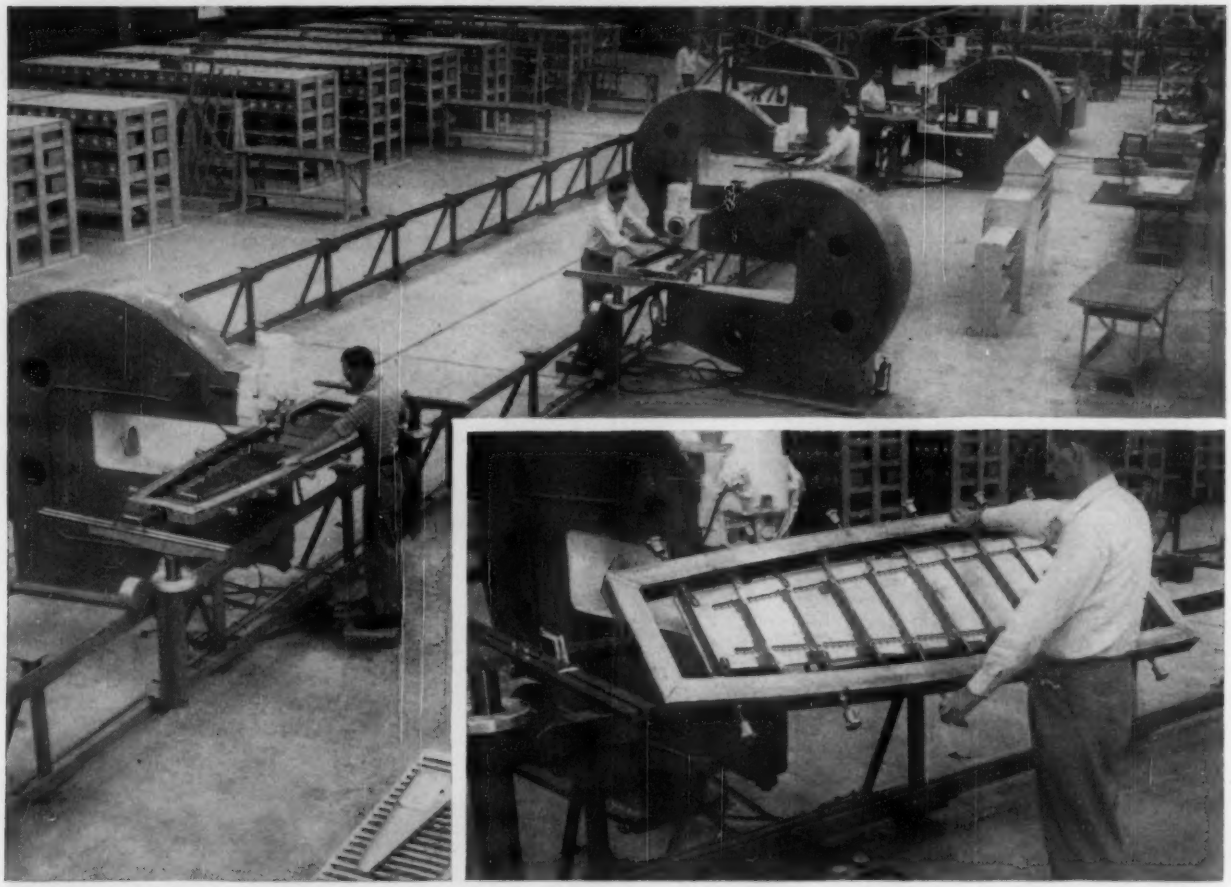
For these sensational new sintered bronze cage roller bearings, perfected by Hyatt engineers, have proved beyond a doubt that they can lick the oil-failure problem. Applied to the compressors and turbines of jet engines, Hyatt "Safety Reserve" Bearings have *performed perfectly for more than 30 hours with no lubrication whatever.* This historic contribution to aviation safety once again demonstrates why we say: When you're faced with a formidable "bearing barrier," *come to Hyatt for help!* Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT

STRAIGHT BARREL TAPER

ROLLER BEARINGS



VERTICAL TRACKS provide mobility for easy-to-handle picture-frame fixtures (shown in insert), moving past Erco auto-riveters.

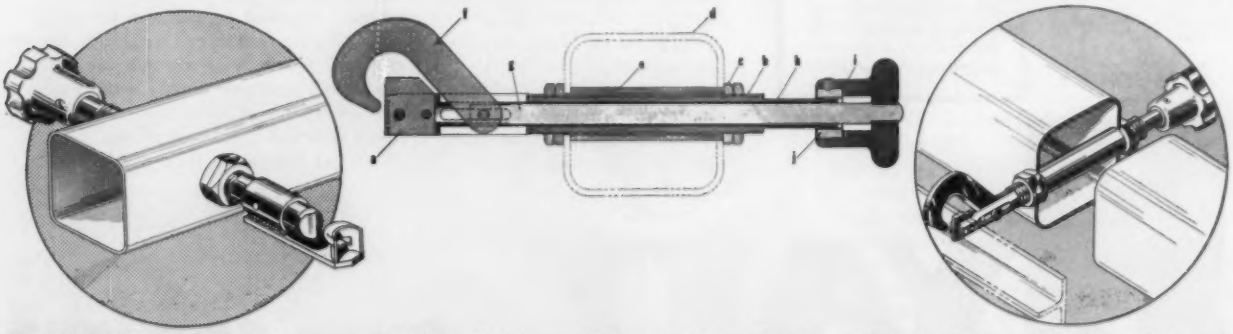
Convair Experience Shows How . . .

Automatic Riveting Shaves Tolerances

Riveting tolerances will be shaved very fine in Convair's upcoming supersonic B-58 jet bomber. To cope with the resultant change in riveting requirements, Convair-Ft. Worth manufacturing research engineers have put the fruits of four years of study into a new setup built around automatic and semi-automatic processes.

The new automated fastening scheme, set up early last December, is at work now at Ft. Worth on subcontracted Boeing B-52 Stratofort bomber and Convair-San Diego F-102 parts, prior to the important role it will play in B-58 production.

▶ **Switch to Automatic**—Company engineers see many other potentialities in the philosophy of substituting automaticity for current manually performed airframe operations such as drilling,



SIEWEK CLAMP DETAILS: (a) preset positioner, (b) in-out adjustment, (c) retainer, (d) workpiece, (e) sleeve, (f) hook, (g) tie rod, (h) holder, (i) handle, (j) threads for engaging holder threads. Clamp is shown with spar cap channel (left), tee-sections (right).

slotting, spotwelding, trimming, tapping, countersinking and others.

They envision subassembly machinery set up in long rows, with positioning equipment moving work from one machine to the next, bypassing those not required in a particular operation.

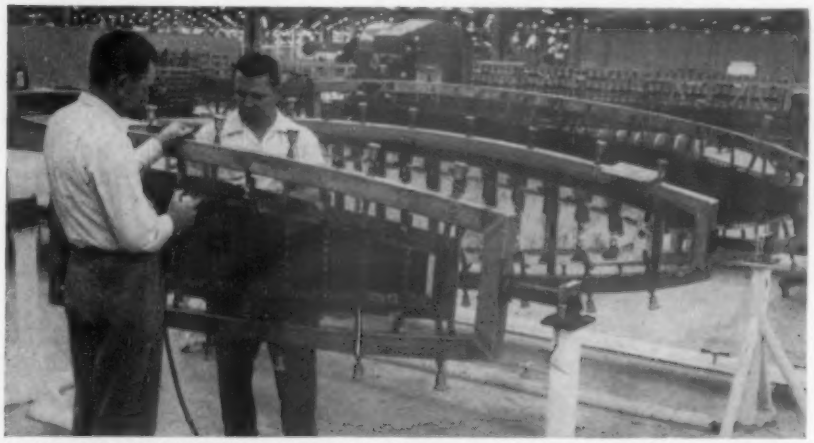
Such processes should provide broad new fields for production-machinery makers and suppliers of fixtures and auxiliary devices, while increasing uniformity and product quality for the airframe manufacturer.

Automating the riveting process, as outlined by Clinton A. Bay, tool engineer, manufacturing research section of Convair-Ft. Worth's tooling department, shows how important some of these benefits can be.

• Had this process been available at the time of B-36 tooling-up, he estimates that at least 30% of the over 15,000 man-hours used in installing an estimated 3.2 million rivets, screws and bolts could have been saved. In addition, the new method would have saved about 55% of the $3.5-million investment in riveting guns, bucking bars, drills, squeezers and the like used on the B-36.

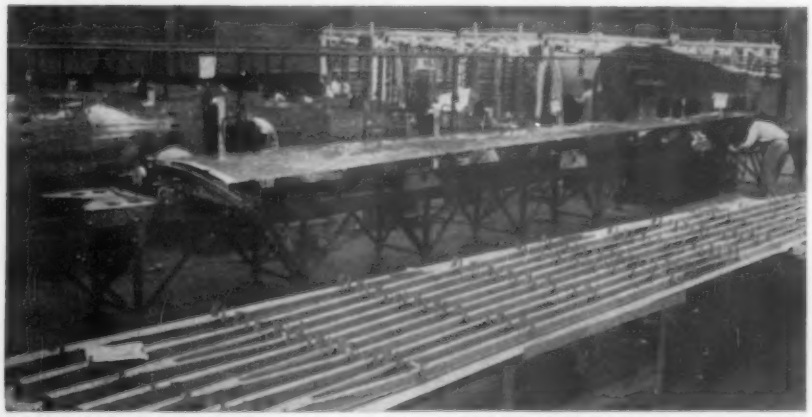
• On the B-36 less than 12% of applicable assemblies were reprocessed to take automatic riveting; right now, Ft. Worth installs 70% of fasteners using automatic or semi-automatic methods. "Hand-riveting is used as a last resort," Bay told AVIATION WEEK.

• The close tolerances used today can be attained. Where, in the B-36, perimeter ordinates of many riveted assemblies had allowable plus-or-minus tolerances of 0.032 in., comparable B-58 tolerances must be held to plus-or-minus 0.004 in., Bay says.



ADJUSTABLE TRUNNION STAND holds fixture when hand-tool operations are necessary.

FIXTURE STORAGE takes little room. Entire new riveting operation takes only 7,500 sq. ft.



DRIVMATIC drills, countersinks, feeds and heads 5,000 flush rivets in outer wing panel.

To obtain these tolerances, Convair considered two possibilities:

• Build the assemblies with excessive material, then bring them to desired size and shape using perimeter milling.

• Minimize tolerance "growth" by containing and restricting all detail parts in place throughout assembly.

Initial studies revealed that perimeter milling would take at least three times the present maximum machine shop capacity and also entail exorbitant manufacturing costs. In addition there was a high potential of machining spoilage.

Convair then decided to refine the riveting processes and the problem was assigned by Ralph Fuhrer, chief tool engineer, to his assistant, G. R. Gordon, director of manufacturing research and development for the Ft. Worth Division's tooling activities.

▶ **Automated Riveting Lines**—These are the lineups that Convair-Ft. Worth has developed for speeding riveting processes:

• One utilizes two 115-ft. vertical tracks set up in parallel and directly opposite to one another.

• Another setup, for much larger assemblies, utilizes parallel horizontal tracks, each with a General Riveters Drivmatic in the center. The tracks have twin rails and end carriages for positioning the work. This equipment has additional automation that incorporates perforated tape programming and photocell spacers to work out the proper operational sequences.

On the vertical-track setup, the first track starts from the fixture storage area, runs alongside the production part detail stock bins and past one Erco automatic riveting machine.

The other track is located in front of five other Erco riveters, three facing one way and the other two the opposite way. Beyond these are two Chicago Pneumatic 625 squeezers facing each other. At the end of the track is a cleanup area with its portable pneumatic hand tools.

Gates at each end of the tracks allow transfer of carriages, fixtures and parts from one track to the other.

Fixtures are lifted from the storage racks by one-man monorail hoist and loaded on the carriages. Carriages then move through the detail stock bin area where respective details are secured in position. Then they go to the first automatic riveter, where angle stiffeners are fastened to the webs.

The adjacent gate then moves the unit assembly to the opposite track where the five automatic riveters perform their specific tasks. After this, the carriage goes to the cleanup area where operations inaccessible to or unadaptable to auto-riveting are handled. From here the work goes to the end of the track where a cycle-checked fix-

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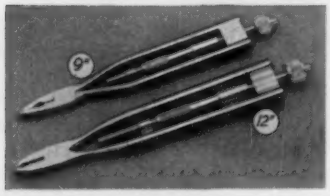

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How Automated Riveting Saves Time

Work Operation	Conventional Method (hr.)	Automatic Method (hr.)
Loading detail parts onto fixture	0.20	0.20
Riveting webs to stiffeners	1.20	0.67
Riveting webs, stiffeners to chords	0.50	0.18
Riveting webs to chords	1.18	0.42
Cleanup	1.00	1.00
Total	4.08 Hr.	2.47 Hr.*

* Convair estimates that familiarization, operational skills and fabrication techniques will further improve this fabrication time at least 25%.

ture is used as a perimeter gage.

Following acceptance, the parts are set on racks, just beyond the transfer gates, which are used as the free stock area for final assembly operations. Carriages with their empty fixtures are rolled onto the second transfer gate and moved to the opposite track. Here the monorail hoist then picks out the fixture, returning it to its proper storage spot and takes another fixture and reloads the track for a renewed work cycle.

Four adjustable trunnion stands are located opposite the bank of riveters and are used primarily for assemblies unadaptable for automatic fastening, but may also be used in event of emergency. Jib booms atop each autoriveter can quickly remove fixtures and carriages if necessary.

▶ **Fixtures Used**—Picture-frame-type fixture structure was selected because of its accessibility, economy of construction, wide adaptability and ease of construction from basic design sketches. Good mobility was obtained by mounting the trunnion posts on carriages and weight reduced by using aluminum makeup. Aluminum construction also makes them easy to store in racks or stacks, reducing space by 75%.

▶ **Clamps and Locators**—Clinton Bay notes that obtaining proper clamps and locators was "a paramount problem," and a market survey failed to disclose a standard purchaseable item that would be economical, sturdy and accurate while adjustable.

Siewek Tool Co., Detroit, asked Convair to supply requirements and went to work using these specifications as a base:

- **Combine the clamp and locator** as one unit, minimizing obstruction and providing position accuracy.
- **Mount the unit** through the fixture frame structure, rather than on top or below, providing greater machine throat clearance, better rigidity and economy.
- **Hook and locator units** should be interchangeable to correspond to design of the work.

The Siewek clamp meets these requirements and its initial cost is comparable to conventional products. But durability and reusability makes its ultimate cost less, Convair says.

Where a web with intermediate stiffeners is being built, a template or platen is suspended inside the fixture frame on crossties. Cutouts in the template provide a nesting-type location for detail parts. Pilot holes and guide holes are cut through the template for locating the riveters.

Rivets inaccessible to the machine are drilled by hand and squeeze-set.

▶ **Work Carriage Design**—To move fixture and parts conveniently and economically, the work and positioning carriages, which are mounted on the vertical tracks, are of cantilever design, providing minimum weight plus clearance of carriage and work through the machine's throat, transverse and lateral positioning travel, height adjustability, usage flexibility and installation economy.

THRUST & DRAG

We still know comparatively little about the ways to get out of an airplane about to auger in. Read this quotation from an RAF pilot who just managed to escape from a Canberra bomber in a highspeed spiral dive:

"I was unable to release the control column from between my legs owing to the tremendous G-force." (Before ejection, the control column has to be released, which requires hand motions downward and forces exerted downwards.)

"In the end I knew I couldn't get my hand down, but I lifted my hand up and it was knocked back against the handle which operates the ejecting mechanism. I just ejected through the canopy. I remember coming to and found myself falling through the air and then carrying out the drill of separating myself from the seat. The only clear memory I have was after my parachute opened. It was quite a short fall." —DAA

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Cessna T-37	**Lockheed F-104**
Convair F-102	**Martin B-57B**
Douglas A4D	**North American F-100**

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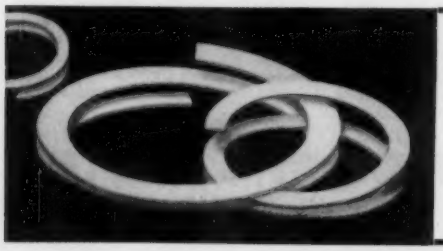

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IAS Summaries

The following columns continue AVIATION WEEK's publication of summaries of papers presented at the recent 23rd annual meeting of the Institute of the Aeronautical Sciences.

Approximately 80 papers were presented during the four-day meeting.

Last week's installment included summaries of 11 papers on Aerodynamics, Structures, Stability and Control, and Aeroelasticity.

The series will be continued in succeeding weeks, until all summaries made available to AVIATION WEEK by the IAS have been printed.

Aeroelasticity

▶ **The Divergence of Supersonic Wings Including Chordwise Bending.—Maurice A. Biot, Consultant, Cornell Aero. Lab., Inc.**

The static aeroelastic stability or divergence problem is investigated for thin supersonic wings when not only the spanwise bending and twist is taken into account, but also the chordwise bending. The problem is treated in successive phases of increasing complexity from the two dimensional curling up of the leading edge, to the three dimensional stability of the cantilever wing.

Several methods of approach are developed including the non-linear aspects of the structure and the aerodynamics. Results indicate a strong dependence of stability on Poisson's ratio and the magnitude of the deformation.

▶ **The Dynamic Response of a Large Airplane to Continuous Random Atmospheric Disturbances.—Franklin W. Diedrich, Head, Dynamic Loads Analysis Sect., Langley Aero. Lab., NACA.**

The motions and stresses in turbulent air of a flexible airplane which is so large that the spanwise variation of the turbulent fluctuations have to be taken into account are analyzed by extending the theory of stationary random processes and applying it to this problem. The results of some calculations indicate that the inclusion of the effect of spanwise variation tends to decrease the magnitude of the motions but may increase the magnitude of the stresses significantly.

▶ **The Design and Testing of Supersonic Flutter Models.—John F. McCarthy, Jr., Sr. Engr., Aeroelastic and Struct. Research Lab., and Robert L. Halfman, Asst. Prof., Aero. Engrg., MIT.**

The basic problems of flutter testing in the low supersonic speed range (Mach number 1.2–2.0) are outlined. The requirements for models which simulate full-scale airplanes when Mach number is included as a parameter are reviewed, and are compared with those where velocity is scaled so that flutter occurs in the range of a low-speed windtunnel.

A particular type of construction for supersonic flutter models is described in detail. Methods of vibration testing, static testing and flutter testing are discussed. Particular emphasis is placed on the tech-

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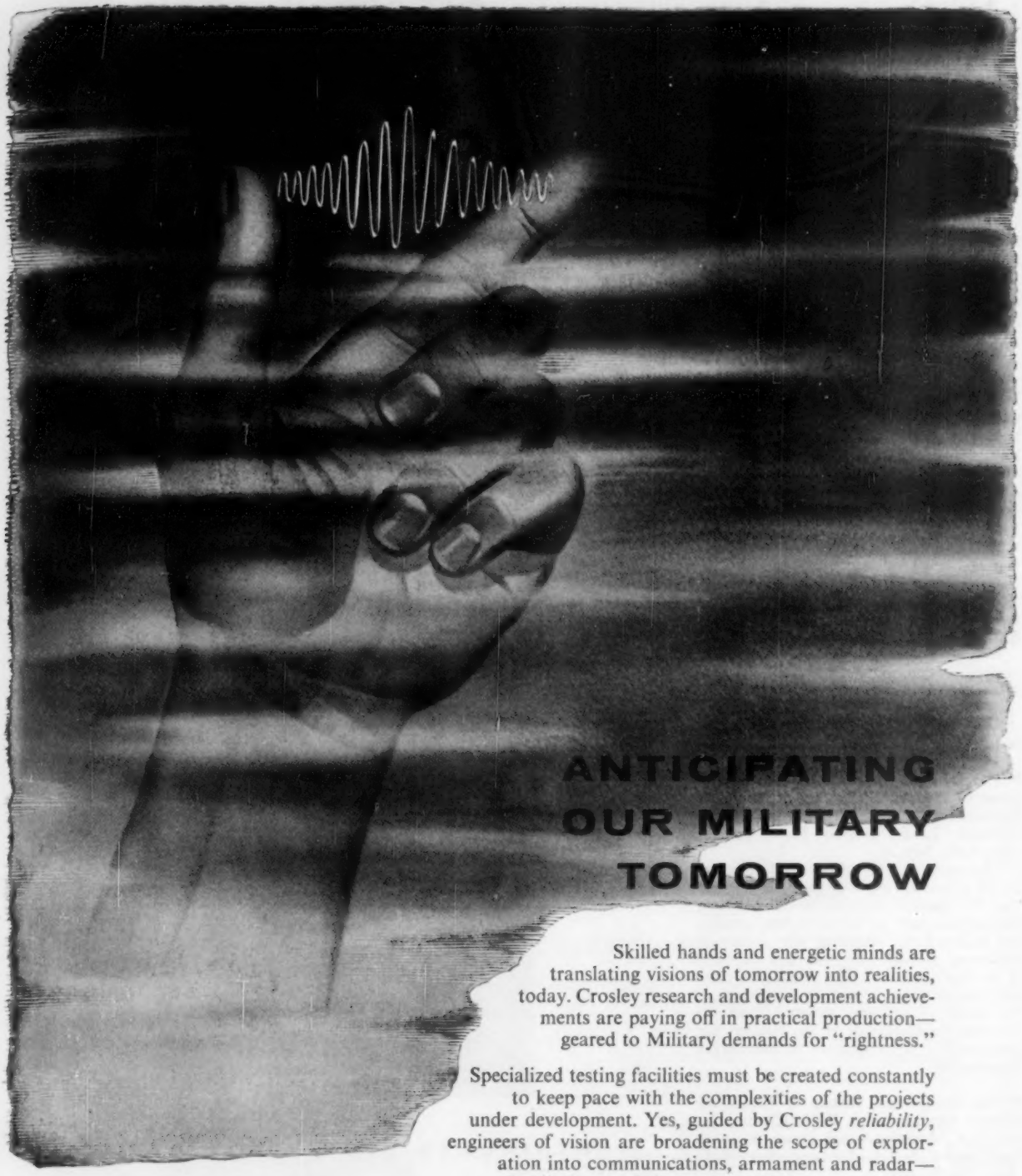

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nique of varying flow parameters rather than model parameters to precipitate flutter. The tool for varying flow parameters is the variable Mach number supersonic test section of the MIT blowdown windtunnel whose aerodynamic features are presented.

▶An Approach to the Flutter Problem in Real Fluids.—N. Rott, Assoc. Prof., Aero. Engrg., Grad. School of Aero. Engrg., Cornell Univ., and M. B. T. George, Aerodynamics Engr., Santa Monica Div., Douglas Aircraft Company, Inc.

It is well known that ideal-fluid theory does not quite adequately describe the behavior of an airfoil in steady flow even before the stall is reached. Satisfactory results have been obtained in steady-flow theory, however, by slightly relaxing the Kutta condition, such that the lift curve slope is adjusted to its empirical value.

Present work is an extension of this idea to unsteady-flow problems. The generalization is made possible, in the formulation of thin-airfoil theory, by interpreting the empirical lift curve slope as a relationship between the admissible singularities at the leading and trailing edges. It is postulated that this relationship holds also for unsteady flow. A physical interpretation of this statement is given, and a further generalization is suggested by introducing a time lag into the relationship; this gives a further empirical variable, which may be adjusted to the experimental results.

A flutter theory is obtained which may be built up consistently within the framework of inviscid flow theory, but with the Kutta condition relaxed to obtain deviations due to viscous effects. Flutter coefficients are calculated, and the possibility of one-degree-of-freedom flutter is fully discussed.

Although the theory is not considered to be valid for too large deviations from the inviscid lift curve slope, i.e., for stall flutter proper, the discussion is extended into this domain. It is suggested that present theory may be a first step towards an improved theory of stall flutter.

Aerodynamics

▶An Approximate Method of Calculating Three-Dimensional Compressible Flow in Axial Turbomachines.—Lt. Comdr. Carl O. Holmquist, USN, Sr. Engr., Carrier Br., Flight Test Div., and W. Duncan Rannie, Assoc. Prof., Mechanical Engrg. Dept., C.I.T.

The two principal existing methods of calculating axially-symmetric compressible flow in turbomachines are:

(1) A simplified one-dimensional analysis.

(2) Numerical methods using the complete or linearized flow equations.

The first is not satisfactory for multi-stage turbines with appreciable wall divergence; the second is very tedious and time-consuming.

The purpose of this investigation is to extend the approximate methods, successfully used in calculating incompressible flow in compressors with constant blade height, to the analysis of compressible flow in turbomachines with variable blade height. Assuming that the blades can be completely defined by the exit flow angle, and neglecting the influence of down-stream blades, the analysis is made considering the flow between successive blade rows only. With

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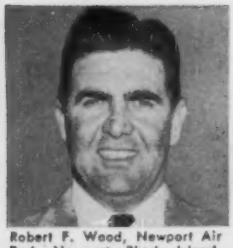


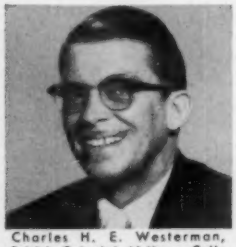
Robert F. Wood, Newport Air Park, Newport, Rhode Island.

A. M. "Sime" Bertolet, Reading Aviation Service, Inc., Municipal Airport, Reading, Pennsylvania

H. Leibee Wheeler, Buffalo Aeronautical Corporation, Buffalo Municipal Airport, Buffalo, New York.

Don Hood, Air Sales & Service, Inc., Weir Cook Municipal Airport, Indianapolis, Indiana.

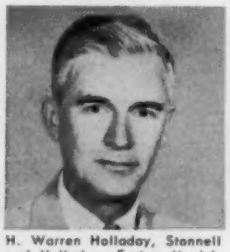
Don Pennington, Southern Aero, Inc., Municipal Airport, Atlanta, Georgia.



Charles H. E. Westerman, British Colonial Airlines, Calle Lopez No. 1 — Despacho 502 Mexico, (1) D.F., Mexico.

O. B. Callan, National Aero Sales Corp., Midway Airport, Chicago, Ill.

Max R. Brand, Aero Commander Distributors, Hanger 3, P.O. Box 8426, Municipal Airport, Tulsa, Oklahoma



H. Warren Halladay, Stonnell and Halladay, Easton Municipal Airport, Easton, Md.

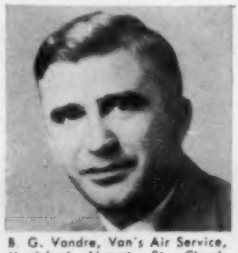
Cheston M. "Ches" Newhall, The Babb Co. (Canada) Ltd., Montreal Airport, Dorval, P.Q.

Don Vest, Vest Aircraft & Finance Co., P. O. Box 5306, Sky Ranch Airport, Denver, Colorado.

Gene Hudman, Carolina Division of Southern Aero, Inc., Charlotte, North Carolina.

Louis Humphreville, Executive Aircraft Corp., Detroit City Airport, Detroit 13, Michigan

George Harte, Harte Flying Service Inc., Chanute Municipal Airport, Chanute, Kan.



B. G. Vandre, Van's Air Service, Municipal Airport, St. Cloud, Minnesota.

Art Meurer, Arthur Meurer Co., Inc., LaGuardia Field, New York, N. Y.

Peter Graves, Southern Ohio Aviation Sales Co., Dayton Municipal Airport, Vandalia, Ohio.

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tween successive blade rows only. With these restrictions, subsonic and isentropic supersonic flow patterns can be determined for compressor or turbine arbitrary boundary shapes as long as separation does not occur. Average losses can be accounted for by the use of a polytropic law, and the effect of radial variations in stagnation temperature can be included without difficulty.

An example is given illustrating the flexibility and practical value of the iteration method which has been developed and the rapid convergence of successive solutions.

▶Some Recent Aerodynamic Techniques in Design of Fin-Stabilized Free-Flight Missiles for Minimum Dispersion.—M. W. Hunter, A. Shef, and D. V. Black, Santa Monica Div., Douglas Aircraft Co., Inc.

In the past, finned rocket design was usually based on an attempt to restrict the flight path angular deviation during burning, by obtaining maximum possible longitudinal stability to decrease the effect of internal rocket disturbances. In recent years, with the increased interest in rocketry and guided missile design, more sophisticated design techniques have been developed which permit appreciable reduction in dispersion by considering the conflicting stability requirements from internal and external disturbances.

Not only is optimum compromise attempted, but the component errors are attacked individually by fundamental spin programming (other than simple monotonic programs) and by utilization of techniques similar to those used in such fields as electronic feedback theory and noise analysis. It is shown that the use of such combined techniques effectively reduces rocket flight path angular dispersion.

▶On Strong Transverse Waves Without Shocks in a Circular Cylinder.—Stephen H. Maslen and Franklin K. Moore, Lewis Flight Propulsion Lab., NACA.

A study is made of large-amplitude pressure waves transverse to the axis of a cylindrical chamber (for example, a rocket or jet engine). Whereas plane acoustic waves are known to steepen progressively into shocks, strong, permanently isentropic (that is, shock-free) waves can occur in the transverse modes, viscosity neglected. The form and frequency of these strong waves depend on amplitude.

The wall boundary layer causes, throughout the chamber, a steady second-order rotational flow ("acoustic streaming") which is responsible for a progressive damping of standing, but not traveling, transverse waves. The viscous dissipation of wave energy in the boundary layer itself is analyzed.

The possible isentropy of strong transverse waves suggests that, if energy is suitably supplied (for example, by coupling with combustion) extremely violent waves may be more likely in transverse than in longitudinal resonance. This conclusion is further supported by consideration of boundary-layer dissipation, especially in short chambers.

▶A Method for Predicting Lift Effectiveness of Spoilers at Subsonic Speeds.—Arthur L. Jones, Sr. Proj. Engr., Owen P. Lamb, Sr. Devel. Engr., FluiDyne Engineering Corp.; and Alfred E. Cronk, Assoc. Prof., Dept. of Aero. Engrg., Univ. of Minnesota,

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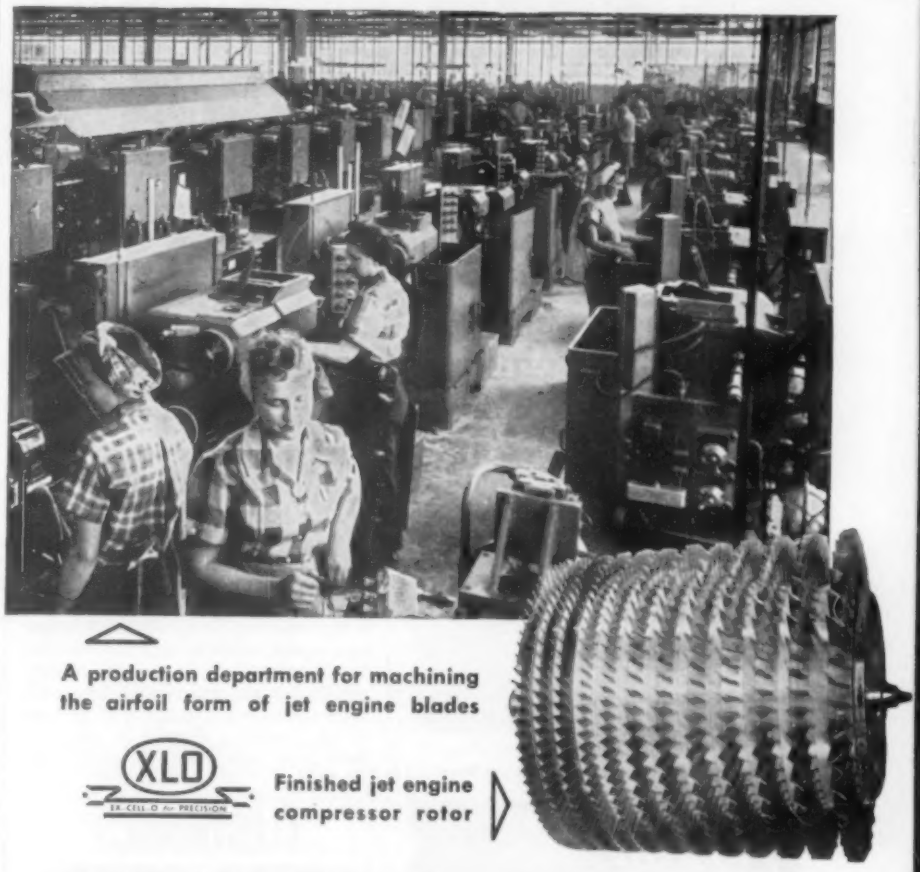

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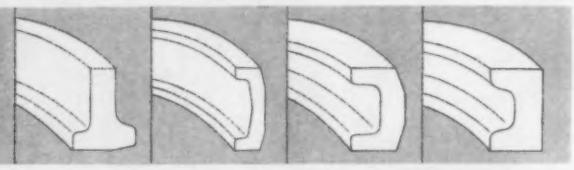

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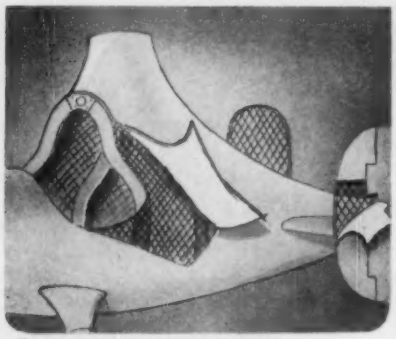

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Methods for estimating the lift effectiveness of ordinary flap-type control devices can usually be developed by application of thin airfoil theory. However, control devices depending on flow separation for their effectiveness, such as spoilers, have not proven amenable to analyses based solely on potential flow considerations.

In the case of plain spoilers, a semi-empirical approach utilizing both lifting surface theory and experimental data has provided a satisfactory basis for analyzing variations in spoiler lift effectiveness. The method of prediction which evolved proved to be applicable at subsonic Mach numbers up to approximately 0.95 for an angle-of-attack range restricted to an upper limit of about 6°. The method takes into account the effects of the following parameters: aspect ratio, taper ratio, sweepback, airfoil thickness ratio, chordwise location and spanwise location of the control and spanwise extent of the control.

A design chart presentation has been used to show the relative effects of variations in each parameter and to provide for a rapid, straightforward prediction procedure.

Structures

▶ Balance Method in Sweptwing Stress-Analysis.—Luigi Broglio, Prof., Theory of Aero. Strut.; Dean of School of Aeroengineering, Univ. of Rome.

The Balance Method is a general procedure for solving engineering problems. In this paper it is applied to the problem of sweptwing stress-analysis.

The essential purpose is:

- To reduce the problem of the sweptwing under whichsoever load-distribution to that of the same structure under a special load-distribution constituted by self-balanced systems of forces:
- To supply a general procedure of successive approximations such that, at every step, all the "residuals" be again self-balanced systems of the same type.

As a result, the advanced problem of the sweptwing is solved in an exact way with only the use of quite simple numerical operations; such operations can be arranged in such a way to be easily applicable in the common practice of design.

The paper shows graphically the results, which are also compared with other and elementary results.

Stability & Control

▶ Flight Research Utilizing Variable-Stability Aircraft.—W. O. Breuhaus, Asst. Dept. Head, Flight Research Dept., Cornell Aero. Lab., Inc.

Several flight research programs have been conducted by the Cornell Aeronautical Laboratory utilizing variable stability and control aircraft. These airplanes have been especially equipped with servo-operated controls, and the inputs to these servos have been such that the static and dynamic stability characteristics of the airplanes could be varied through wide limits.

The control surface deflections required to modify the apparent stability characteristics of the aircraft were obtained without corresponding motion of the pilot's cockpit controls, while control surface deflections

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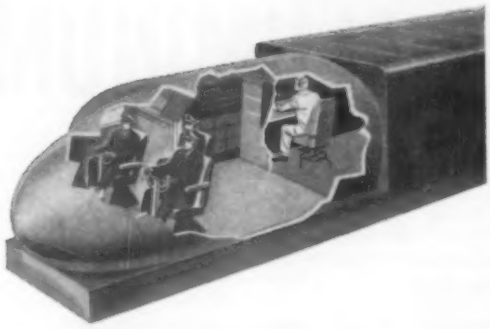

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For example, whole sub-assemblies may be replaced with a single aluminum forging, thus often greatly reducing production costs of the finished product.

You should take steps now to see where the greater use of aluminum forgings can give your products the additional benefits of light weight, high strength, dimensional uniformity, and corrosion resistance.

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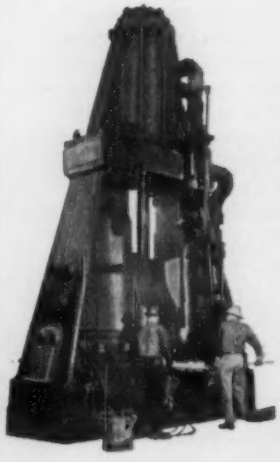


Better service for users of forgings

Kaiser Aluminum's recently-acquired Erie forging plant—one of the nation's three major aluminum forging plants—is now providing industry with a continuing supply of high quality aluminum forgings, plus nationwide service.

The Erie plant can produce aluminum die forgings from the smallest size up to 150 pounds as well as hand forgings up to 700 pounds, and has a rated capacity of 12 to 15 million pounds per year.

For years, Kaiser Aluminum has been a major supplier of aluminum in many forms. The acquisition of the Erie plant makes it possible for us to bring important benefits to users of forgings.

Sales service—The addition of aluminum forgings to our wide range of mill products enables our nationwide sales force to increase its service to our customers. Personal attention is given to every order from the time it is received until the forging is delivered to the customer.

Engineering service—We are increasing the present staff of experienced engineers. These men are highly skilled in die and forging design and are available for customer consultation.

Quality control—Trained laboratory technicians, using the most modern testing methods and equipment, assure highest quality forgings to meet rigid specifications.

Production control—The most modern methods of production control are employed to expedite material flow, die making, forging and finishing operations, thus insuring maintenance of shipping schedules.

due to the pilot were obtained by normal manipulation of the cockpit controls. The control forces felt by the pilot were independent of the aerodynamic hinge moments, and they too could be varied through wide limits. Adjustment of the stability and control force characteristics of these aircraft could be made easily during flight.

These airplanes have proven to be particularly useful for investigating the effects of changes of aircraft stability and control characteristics on handling qualities. The results of this research form a basis for recommendations for handling qualities requirements, as well as permitting flight evaluation of unusual configurations in advance of their use in new aircraft.

Factors considered in the design of this research equipment, flight techniques, and certain results are discussed.

Aircraft Design

▶**The Procurability Program of the Air Force.—Otto H. Malz, Directorate of Laboratories, Wright Air Development Center.**

The time and cost required for the completion of Air Force programs has continually increased with the growing complexity of Air Force material.

It has become almost common belief that the growing complexity can only be overcome by the introduction of unique designs, new materials, specialized production equipment, and specialized techniques. This practice has taxed the aircraft industry and its supporting industries to an extent which compromises the flexibility of military planning.

This paper explains the Procurability Program which is designed to remedy the situation; it shows the dominating part which the preliminary design personnel will have in the implementation of the program.

▶**Aircraft Design and Mission Compatibility.—Frederick M. Gloeckler, Technical Dir., Analytical and Computer Dept., U. S. Naval Air Development Center.**

The compatibility of the aircraft system design characteristics and the mission to be accomplished is perhaps the most important problem that has to be resolved before a successful development program can be undertaken. While this is true for both commercial and military aircraft, it is particularly true of the military aircraft since its operational environment is much more complicated due to the presence of the enemy and his selection of weapons and strategy.

This paper presents an analysis of a hypothetical and simplified military situation wherein the major factors and over-all effectiveness of a military air transportation system are considered. Such considerations as the type of propulsion, the size and speed of the aircraft and their influence on the load and range capabilities, as well as the susceptibility to enemy action are analyzed. Also included are the effects of the flight plan variation and the use of countermeasures on mission accomplishment.

The primary purpose of this paper is illustrate how the use of practical operations analysis techniques are being used to solve seemingly complicated problems in a rather simple fashion and to demonstrate the strong effect of large numbers of aircraft and the consequent reductions in aircraft size.

Meteorology

(In Cooperation with the American Meteorological Society)

▶**The Low-Level Jet Phenomenon.—A. K. Blackadar, Visiting Prof., Dept. of Meteorology, Pennsylvania State Univ.**

The term *low-level jet* is used to denote the sharp maximum of the wind profile which often develops at an elevation of 1,000 to 4,000 feet above the ground. It is best developed at night, and the wind speed maximum usually occurs at the top of the nocturnal inversion.

When the frictional restraint imposed by the daytime mixing is released by the formation of a surface inversion, the air begins to execute an inertia oscillation. Within the growing inversion the motion is partially suppressed by a downward loss of momentum, but above the inversion the motion is nearly frictionless. The oscillation results in supergradient winds during the middle of the night and usually a noticeable reduction of the wind speed before dawn. Above the inversion, the amplitude of the oscillation and the nocturnal wind speed are both greatest at the lowest level, where the wind is most retarded in the daytime.

In the best developed examples, the upward decrease of speed above the inversion is further aided by a decrease of the pressure gradient with height.

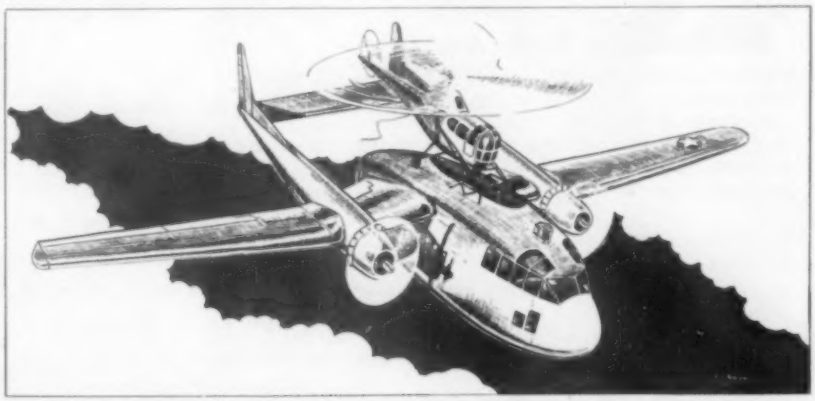
The extreme wind shear which tends to result beneath such inertia oscillations must be an important factor in explaining the upward growth of the nocturnal inversion and occasional turbulent breakdowns, examples of which have been shown by Durst (1933) and Gifford (1952). The low-level jet also plays a prominent role in the formation of nocturnal thunderstorms by providing a nocturnal increase of low-level warm advection and in some cases, a substantial increase of frontal convergence.

▶**Some Airborne Measurements of Atomic Debris.—Lester Machta, Chief, Special Projects Sect., Scientific Services Div., U. S. Weather Bureau.**

Relative measurements of radioactivity along two flight lines in the central and eastern part of the U. S. provide horizontal profiles of the concentration of atomic debris for meteorological analysis. The majority of the profiles obtained between 8,000 and 30,000 feet show the irregularities typical of atmospheric turbulence superimposed on vertical wind shear.

From a few profiles which exhibit the characteristics predicted by theory, an estimate of the "effective" coefficient of lateral eddy diffusion is produced which is of the order of 10^8 cm.^{2}/sec.

Further, a comparison between the predicted position of the cores of the atomic clouds based on meteorological trajectories and the observed position of maximum radioactivity together with verifications of balloon flights suggest that the accuracy of meteorological trajectories decreases with height.



Pick-A-Back Copter Starts Tests

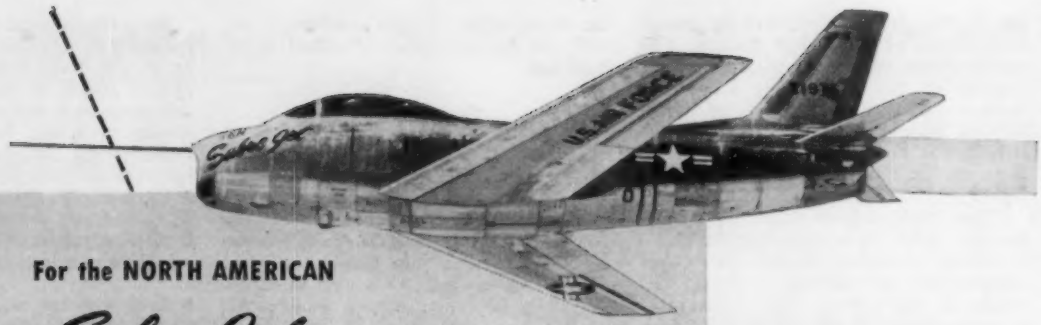
Research project aimed at increasing the range of a rescue helicopter by carrying it pick-a-back style on top of a transport is being conducted for the Air Research and Development Command by Thieblot Aircraft Co., Bethesda, Md.

A model of the parasite aircraft, fixed to the top of a Fairchild C-119, is undergoing windtunnel tests at Wright Air Development Center, Dayton, Ohio. Partly because of growing USAF and Army interest in the convertiplane to solve both range and speed problems, it is unlikely that full-scale flight testing of the idea will be carried out.

USAF's initial effort to extend helicopter range took place several years ago with experiments in towing. The plan was feasible, and pilots with glider experience proved most adept at the controls because they were able to handle tow line surging. However, pilot fatigue became an important factor on long missions and the program was dropped.

Thieblot's pick-a-back project goes back to 1951, when the study contract was awarded to study the practicability of lifting a Sikorsky H-5H (S-51) helicopter on top of a C-119. Locking mechanisms on top of the airplane would be rigged to secure the 'copter's landing gear.

Copter weight is given as 5,300 lb.



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PRODUCTION BRIEFING

▶ **New entry in aircraft canopy** and window field will be General Aniline & Flm Corp., New York, industry observers report. Firm is in advanced development stages of a high-strength, scratch-resistant plastic-type material that it has tradenamed Gafite.

▶ **Koehler Aircraft Products Co.,** Dayton, has been purchased by New Britain Machine Co., New Britain, Conn., and will be operated as a subsidiary.

▶ **Aerophysics Development Corp.,** Los Angeles, active in guided missile projects, has been acquired by Studebaker-Packard Corp., South Bend, Ind. To be operated as a subsidiary, Aerophysics will be headed by its founder, Dr. William Bollay.

▶ **Lear, Inc.,** Santa Monica, Calif., has appointed Avions Marcel Dassault, Paris, its French distributor and service agency for autopilots, yaw dampers, gyro instruments, radio communication and navigation equipment, plane pumps and certain other aviation products. Dassault is a top French fighter-plane producer.

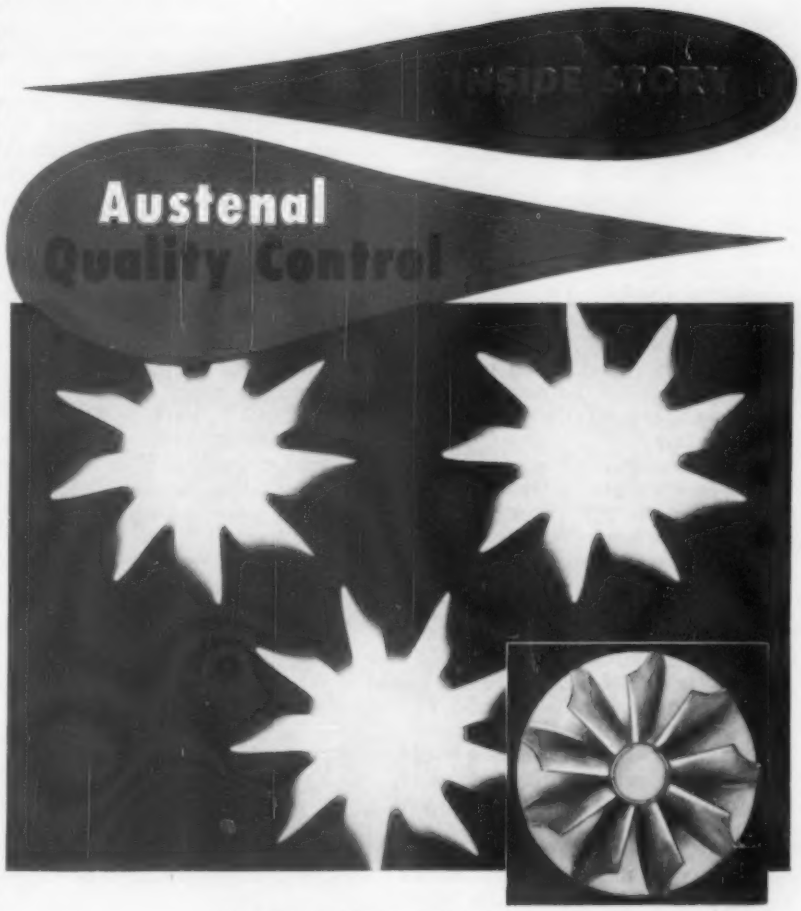
▶ **Alcar Instruments, Inc.,** division of Eastern Electro-Sonic Industries Corp., has moved its plant to 595 Madison Ave., New York 22.

▶ **Employe suggestions** reached new records at Boeing Airplane Co. last year. Awards of $121,040 were made on 2,153 suggestions picked from 11,412 ideas. In 1953 Boeing chose 1,674 suggestions from 9,446 ideas for total awards of $105,170.

▶ **Southwest Airmotive Co.,** Dallas, plans to move into new quarters to replace those that will be razed when the city puts up a new terminal on SAC's present site. Engine overhaul plant will not be affected by the construction. SAC says its 1954 sales totaled about $5.5 million. Its gasoline sales topped the 3-million-gal. mark for the second consecutive year.

▶ **W. S. Shamban & Co.,** Culver City, Calif., has been appointed distributor of Teflon coated glass fabrics made by du Pont for aircraft, electrical and other purposes.

▶ **International Business Machines Corp.** plans to occupy at the end of the year two new buildings under construction at Poughkeepsie, N. Y., where engineering and development will be handled on electronic data processing equipment. Some 500 IBM personnel will work in the new 96,000-sq. ft. facility.



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Navy Jam Blamed On Engine Delays

Failures in the production of jet engines were "the most important single factor" handicapping the Navy's plane program during the post-Korea buildup, Navy Secretary Charles Thomas testified in a closed session before the House Armed Services Investigating Subcommittee.

More than $1 billion in orders for approximately 1,000 planes "which could not perform to specifications and carry out their originally-intended misisons" have been canceled, he reported. The termination cost to the government: $227 million.

▶**Closed Session**—The subcommittee, headed by Rep. Edward Hebert, started its investigation after Thomas told a briefing session he was "unhappy" about the Navy's plane program (AVIATION WEEK Feb. 7, p. 13).

He pointed to the sharp drop in Navy's request for new procurement money—from $1.9 billion for fiscal 1955 to $753 million for fiscal 1956. He blamed contract cancelations and production slippages. Thomas anticipated, however, that by fiscal 1957 there would be a sharp upswing in the amount of Navy's requirements for plane procurement funds.

At the Navy Secretary's request, his explanation of the reasons for Navy's lagging program were presented in closed session. Thomas released only a prepared statement.

The subcommittee, however, wants the full testimony publicly released, and has requested Thomas to review it and make deletions justified on security grounds.

▶**Mainstays**—Stating that past problems have now largely been solved and that the Naval air procurement program is moving forward satisfactorily, Thomas reported:

By June 1952, two years after the Korean outbreak, orders were placed for new Navy planes at a rate "about three times as fast as the rate of deliveries of new aircraft immediately prior to Korea. These orders included substantial increases in proven and successful models of jet and high performance types which became the mainstay of operations during the latter part of the Korean war."

But the procurement at this time, he added, "also included substantial production orders for quantities of new aircraft which had been in the design stage only but which were badly needed for the fleet.

"These experimental planes were scheduled for production when the responsible aircraft companies state that in their judgment the models were ready for production. It was considered at that time that these production promises were acceptable as justifiable risks even though development was incomplete and full range and demonstration tests had not been made."

▶**Too Optimistic**—"Fleet squadrons operating in the Korean theater were seriously short of attack-type aircraft," Thomas said. "In fact, losses of this type in some months of 1952 were greater than new deliveries from the factories. It therefore became necessary to substitute the obsolete World War II Corsair fighter for this mission. Under such circumstances aircraft were ordered into quantity production, and in some cases all systems of the airplane had not been proven."

Estimates of the time required to complete the development of engines, component equipments, and airframes "were too optimistic, both by the designers and producers and by the Navy," Thomas declared. "Probably the most important single factor was the unsatisfactory performance and the resulting delays in delivery of new jet engines."

U.S. Group Urges Jap Plane Orders

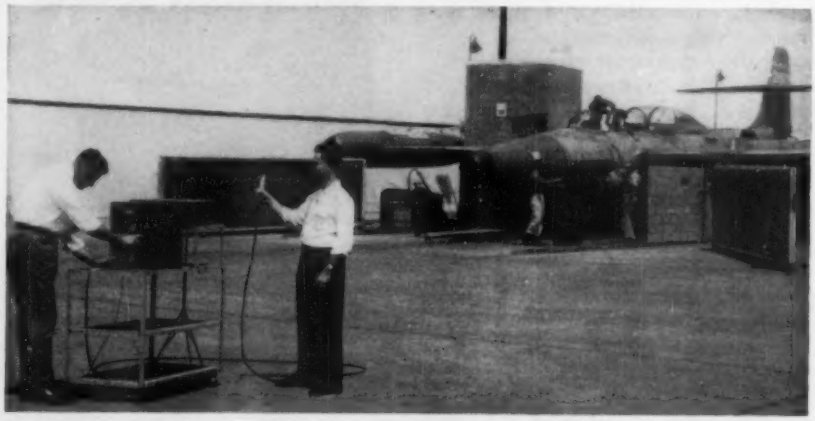
By Dan Kurzman
(McGraw-Hill World News)

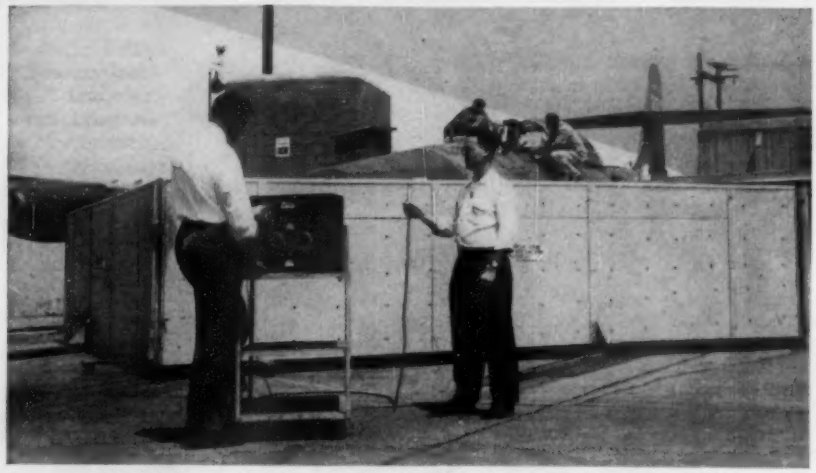
Tokyo—The American Far East Command has recommended to the Defense Department that the United States help finance a project providing for assembly of 170 U. S. jet aircraft in Japan within 28 months.

Under the proposed program, 70 North American F-86 Sabre and 100 Lockheed T-33 jet trainers would be assembled in Japanese plants as a step toward building up Japan's air defenses.

▶**$57-Million Plan**—Japanese government leaders look favorably on the plan but are hesitant to accept it unless the U. S. finances virtually the entire project. American officials, on the other hand, say Japan must bear a substantial part of the cost.

The tentative U. S. proposal calls





Muffler Doors Used in 'Project Hush'

A 10% noise reduction at Northrop Aircraft, Inc.'s engine runup area has been achieved by enclosing the giant engine mufflers with soundproof doors. Enclosures are made of steel covered with padding which is coated with porous cloth. In top picture, Northrop sound engineers measure sound intensity with doors open. Lower view shows how close they must move to the enclosure to get the same noise reading after the doors are closed. Distances are 100 ft. and 15 ft. respectively.

J-M Clipper Seals fly with the Sikorsky HO5S helicopter...

Clipper Seal being installed in the intermediate gear box of the Sikorsky HO5S helicopter to seal oil in, keep abrasives out.

Photograph and cross section of Type LPD Clipper Seal. This is just one of numerous styles available to solve tough sealing problems.

...seal oil in, keep abrasives out, at critical locations

To retain the lubricants vital to its complex rotor and gear systems . . . and to protect bearings against the infiltration of abrasives . . . the new Sikorsky HO5S helicopter depends on these positive sealing qualities of Johns-Manville Clipper Seals.

Clipper Seals are flexible—molded of special compounds, they have a tough, dense heel and a soft flexible lip concentrically molded into one piece.

Clipper Seals reduce friction—A specially designed garter spring holds the lip in tight but firm contact with the shaft. Thus a positive seal is always maintained but shaft wear is reduced and overheating is prevented.

Clipper Seals are corrosion-resistant—The molded body is entirely non-metallic, is therefore unaffected by electrolysis and most forms of corrosion. And the garter spring is available in various corrosion-resistant metals.

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To find out more about Clipper Seals and their application to your particular sealing problems, write Johns-Manville, Box 60, N. Y. 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ontario.

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for a total budget of about $57 million in yen, of which the U. S. would provide $36 million—$28 million for the Sabre and $8 million for the jet trainers. This would pay for equipment and parts.

The Japanese would put up $12 million for the F-86s and $9 million for the T-33s, covering the costs of manpower, management, some equipment, runways and factory space.

▶ **U. S. Counterpart Funds**—The American contribution would include $10 million of $50 million in yen counterpart funds accruing from the sale of wheat to Japan. This one-fifth of the fund already has been designated as an outright U. S. grant.

The $24-million balance to be met by the U. S. with other than counterpart funds might be provided under the Mutual Security Administration.

The Japanese would like to use the entire $40 million left over from the wheat counterpart fund, now earmarked to purchase commodities, to finance the jet assembly plan. But American officials oppose this suggestion.

▶ **Diet Debate**—The question of whether the Japanese budget will cover the expenses that Americans insist be borne by Japan probably will come up for debate in the Diet later this month.

The government defense board, despite its desire for greater U. S. assistance, is expected to ask for a special outlay for the jet project in addition to the scheduled $264-million defense budget for this year.

The Diet also would have to grant the government contractual authority to commit funds in advance to cover the following year.

▶ **Builders' Pressure**—Pushing hard for acceptance of the project are the influential Shin Mitsubishi Co. and Kawasaki Aircraft Co., which would assemble the F-86s and T-33s respectively.

It is doubtful, however, that parliamentary approval would be granted before Mar. 1, target starting date for the program under the American proposal.

If it does not get underway on approximately that date, the U. S. may find it necessary to cancel the whole project. A Defense Department regulation provides that any funds budgeted for the current year must be spent by June 30, 1957. By this time, U. S. officials calculate, 170 jet planes can be assembled in Japan. If the production period were reduced, less planes could be assembled, resulting in prohibitive costs.

▶ **Low-Cost Production**—One of the advantages of assembling U. S. jets in Japan, the American recommendation indicates, is the fact that the job can be done at considerably less expense in Japan than in the U. S.

Hydro-Mechanical Control Test Machine checks the operation of the latest jet engine fuel controls with flows to 30,000 pph, and incorporates a 100 hp variable speed drive unit.

After-Burner Boost Pump Test Machine for jet engine after-burner fuel air driven boost pumps with flows to 120 gpm, pressures to 60 psi. Unit gives fast production plus maximum safety.

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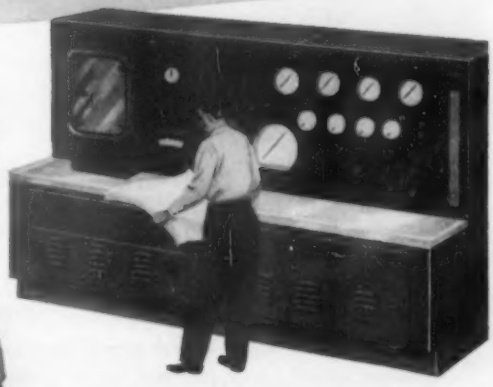

Gas Turbine Ignition System Test Machine completely tests all 28 volt DC and 115 volt, 400 cycle AC aircraft gas turbine ignition units and components under simulated operating conditions.

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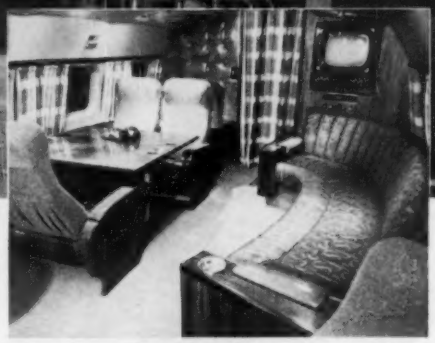

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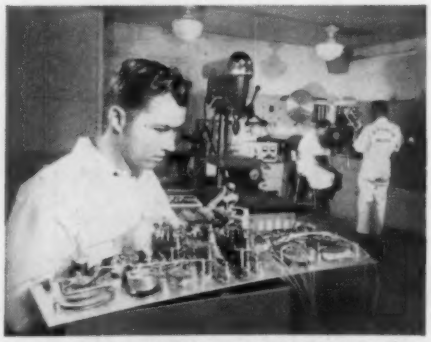

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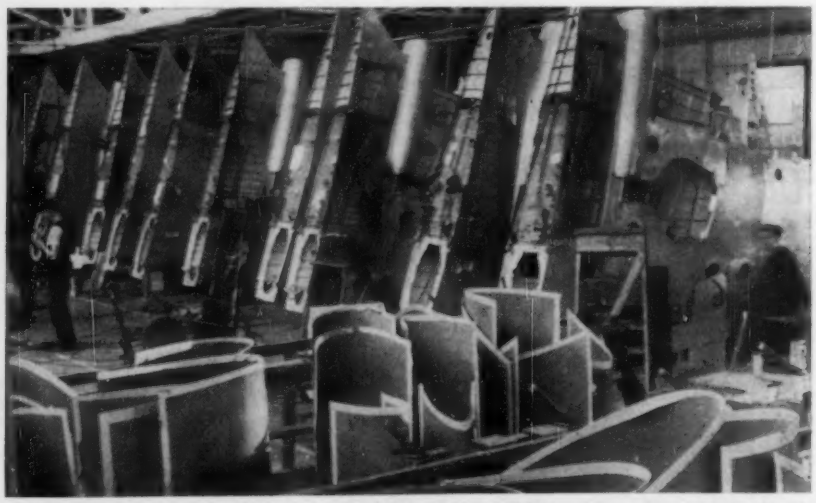
FLINTSHIRE—Main de Havilland production plant, near Chester, produces a half-dozen different types of military and civil planes including Venom day fighters and night fighters, Vampire trainers (left background) and Dove and Heron light transports (foreground).

De Havilland At Work

LANCASHIRE—Propeller division turns out more than a dozen models. Photo shows hubs being processed for steel props slated for Blackburn & General Beverley transports.

HERTFORDSHIRE—Ghost and Goblin compressors are shown being machined in this plant, responsible for turbojets, rocket motors and piston powerplants.



HAMPSHIRE—Wings for day and night fighter and naval Venoms are among components built here. Design, development, engineering are done at Stag Lane and Hertfordshire.

FLY SAFELY

These weather items prepared in consultation with the United States Weather Bureau

PHOTO — VINCENT J. SCHAEFER

CIRRUS—Long distorted streamers (above) identify the strong, shearing winds of the recently discovered JET STREAM. Generally, streaking from NW—means continued fine weather. Spreading from SW—possible rain.

ALTO-CUMULUS—Use the roll structure of such clouds to determine wind direction aloft. Wind blows across the corrugations at right angles to the rolls. Expect light to moderate turbulence when flying near these clouds.

STRATO-CUMULUS—Look for smooth flying above this flat cloud deck. The top surface marks an inversion where temperature increases with altitude. Be careful of icing when descending through the deck in winter months.

PHOTO — PAN AMERICAN WORLD AIRWAYS

CUMULO-NIMBUS—The thunderstorm cloud commonly called a "CB". Watch for squall line development when "CB's" begin to line up northeast—southwest in late afternoon. Such danger usually decreases by midnight.

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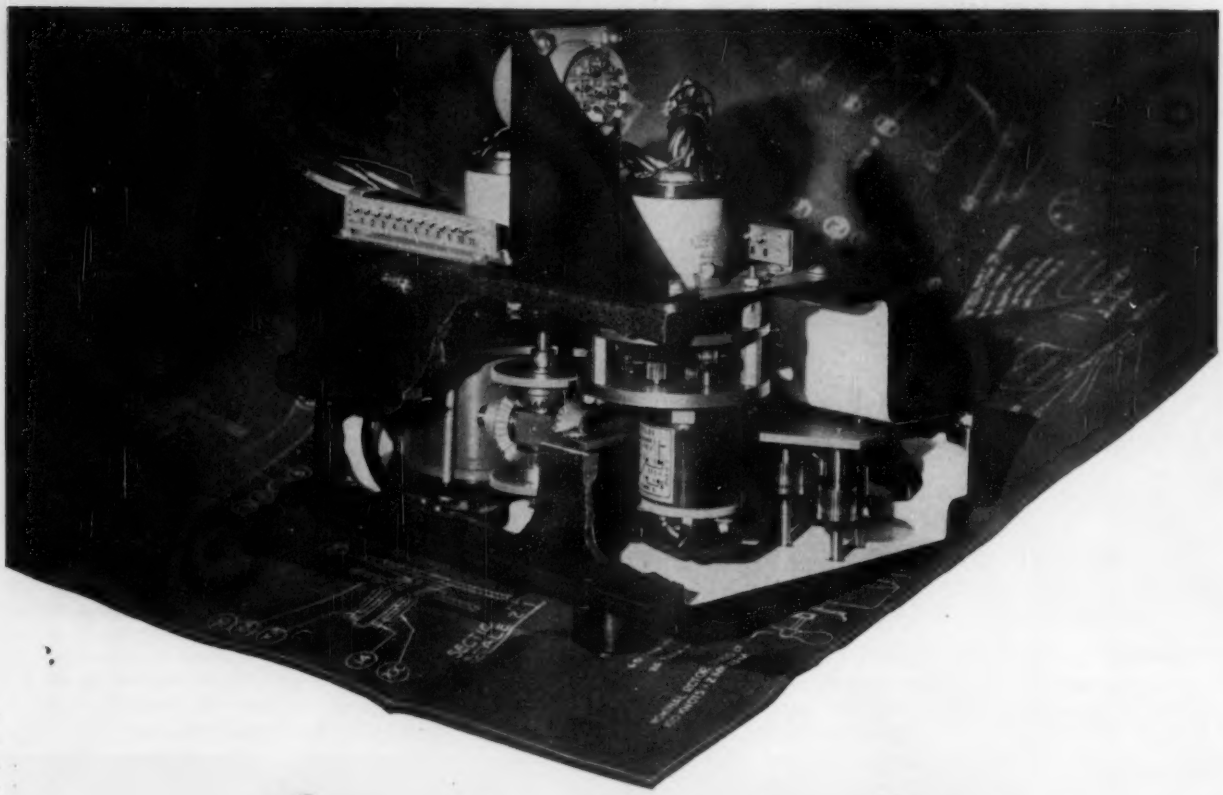
LETTERS

full ½-mi. visibility and with ceilings a clear 200 ft. above the ground.



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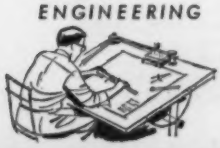

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LETTERS

Allison Turboprop

We nailed this morning's copy of AVIATION WEEK (Jan. 24 issue) when it came in to see the handling of our announcement of the Model 501-D10 turboprop. As usual, Irv Stone had done an excellent job of reporting the facts as we had given them, plus writing in background interpretive comment on his own.

It was a good job and we are glad that your coverage reflects our feeling that this announcement has significant news development in the air transport field.

ROGER C. FLEMING
Director of Public Relations
Allison Division
General Motors Corp.
Indianapolis 6, Ind.

Flight Recorder

For some 12 years I have felt that aviation would be greatly benefited if a suitable airborne flight recorder were installed in each commercial airliner.

Four years ago the writer visited the main offices of the country's leading airlines, and in discussing briefly the writer's ideas and sketches along with a brief paper written by the writer, the general opinion was that something should be done about building a prototype unit.

The CAA was very much interested and said that they would test such a unit. The chief engineer of one of the country's leading airlines told the writer that he would test the unit in DC-6Bs, Convair 240s.

The writer's "AiRecord" is photographic in principle, operating on light frequencies above the visible range on a pulse arrangement automatically shooting instrument readings and cockpit control settings at three-second intervals on landings and take-offs and at one- to three-minute intervals during cruise conditions.

The package weighs approximately 11 pounds, is approximately 9 x 7 x 6 inches in size, operates on 24 volts d.c., is heat resistant and will withstand accelerations experienced in crashes.

The "AiRecord" will operate 10 to 15 hours without magazine reloading and the film offers the opportunity to check operational procedures of new crews. This feature itself provides a check for potential incorrect practices before damage takes place.

The writer is told that the CAA can not make available $5,000 to $8,000 for building of a prototype which can record the many variables so necessary in the proper analysis of an accident. Often, many days with many experts' time is spent in CAA and CAB accident investigation, with the results still sometimes questionable.

This project could be effected by the saving of just one employe's annual salary now on CAA payroll, and I assure you there are many on this payroll.

I am more concerned with the principle involved—here is a government group founded and paid for to promote and foster safety in aviation, and its expenses are so great that it can't afford to fulfill its original intent. This very situation has been the subject of much personal concern as the writer is not interested in personal gain, either financial or otherwise. The writer is, however, very much interested in aviation and its place in our country's future.

The writer has been offered a position in the Accident Investigation Section of CAB as a structures engineering chief, but like many others can not afford to make the reduction in salary required to enter government service.

One of the unfortunate facts concerning this situation is that the CAA research group at Indianapolis already has developed the light source which the writer can use in this system.

It is suggested that each time AVIATION WEEK readers read about an airliner accident that they analyze the importance of having a report which would be available through a fireproof, G-proof, indestructable, factual 11 pounds, ¼ cubic-foot volumn second co-pilot.

This letter is prompted through your genuine interest in aviation. As evidenced through years of reading your section "Letters" and answers. The writer feels that AVIATION WEEK has contributed much to the science of aviation in its years of factual reporting in the most fascinating age of aviation that we are privileged to be a part of.

BRUCE F. GRIMM
Chief Engineer
Electro-Circuits Inc.
Pasadena 1, Calif.

Slopeline Lights

The column by Captain Robson in the Jan. 31 issue of your magazine (p. 88) is a flagrant example of the well known "big lie" technique. The slopeline approach lights have been subjected for years to a campaign of misrepresentation, abuse and scurrilous criticism by a small group of men representing themselves as speaking for all pilots. These men have had to wait a number of years for an accident they could ascribe to the slopeline approach lights. A number of crashes have occurred at other airports where centerline patterns are installed. No blame has been attached to the approach lights in these cases, and there is no evidence that the approach lights were responsible in any way for the crash at New York International.

It is a matter of record that the slopeline approach lights were installed and tested for several seasons at the Landing Aids Experiment Station at Arcata, Calif. This station was selected because of the frequency and severity of the fogs. The lights were tested by repeated landings in every degree of fog down to visibility as low as 250 ft., or 1/20 mi., and with ceiling zero. Thousands of tests were flown.

It may be beside the point that the slopeline approach lights were declared by the test pilots to be the best and most effective approach lights tested, but it is to the point that the records show that these pilots, shooting landings in solid fog, experienced none of the difficulties and developed none of the bugbears or imaginary troubles hatched up by the minute group of critics who have to land in nothing worse than a full ½-mi. visibility and with ceilings a clear 200 ft. above the ground.

The slopeline approach lights were developed to make landings possible in fog down to ¼ mi., and they were proved out under these conditions. Under present minimums, any pattern of approach lights can serve, as long as the pilot is familiar with it. But when the fog is severe and blots out everything but high intensity approach lights for a mere 500 ft. ahead, the slopeline approach lights are the only pattern yet tried that gives the pilot the vital information on position, attitude, alignment/and/altitude.

H. J. CORY PEARSON
6165-A Carvel Ave.
Indianapolis

(Editor's note: Mr. Pearson developed slopeline approach lights for Civil Aeronautics Administration.)

Need for IFR Control

In reading the article entitled Crowded Areas Need IFR Control by Craig Lewis (AVIATION WEEK Jan. 24, p. 16), it certainly indicated another definite step forward in "The Compulsory State."

I feel confident that this was not Mr. Lewis' intention when he wrote the story and I also feel confident that it will have that exact effect upon a great many readers.

Through the years, I have watched a wrong approach to this entire situation, and as the record shows, we are going to eliminate collisions between airliners and military planes and private airplanes because our regimentation is going to eliminate the private plane completely.

It is strange that the millions of automobiles, trucks and buses can get along on the narrow streets and highways in this nation; but a few thousand airplanes cannot get along in our vast air space. Our so-called congested areas are being complicated day by day by the increasing man-made complications.

I think that any man who gets out and flies himself around this man's United States will agree that simplicity is the one and only answer. This so-called complicated problem that we now have will never be solved by armchair, come-lately pilots.

Can you imagine the people buying automobiles by the millions if there were prohibitive regulations and compulsory technical gadgets by the millions to contend with?

I think the example exhibited in Mr. Lewis' article calls for some simple, down-to-earth thinking.

Thanks for more private airplanes!

HUGH C. ROBBINS
Robbins and Associates
1735 W. Florence Ave.
Los Angeles 47

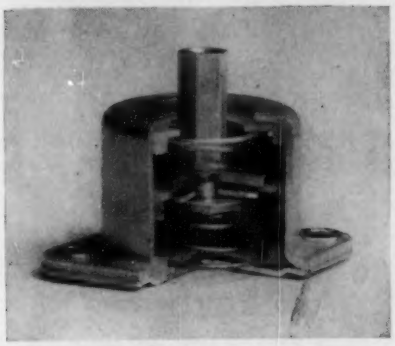
Radar Test Sets

Many thanks for your nice mention of the Hillyer Radar System Test Equipment in your Jan. 3 issue (p. 68). We have received a considerable number of requests for our bulletin.

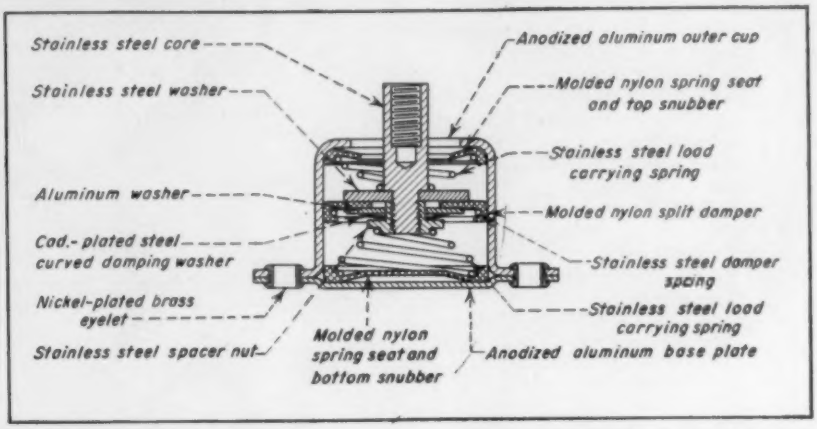
I would like to comment on the high calibre of the people making these requests. You are reaching a top market.

EDMUND ROBERTS
Hillyer Instrument Co.
New York 13

AVIONICS



NEW BARRY MOUNT, shown in cutaway, effectively isolates missile and jet vibration regardless of mounting angle.


Stainless steel core
Stainless steel washer
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Stainless steel spacer nut
Anodized aluminum outer cup
Molded nylon spring seat and top snubber
Stainless steel load carrying spring
Molded nylon split damper
Stainless steel damper spring
Stainless steel load carrying spring
Molded nylon spring seat and bottom snubber
Anodized aluminum base plate

Isolator Damps Vibration at Any Angle

By Philip Klass

A new isolation mount, which not only gives very low amplification of exciting vibration, but can be operated at any angle, including horizontal or completely inverted, has stirred considerable interest in East Coast avionics circles where it's being previewed this month.

Developed by Barry Controls, Inc., (formerly the Barry Corp.), the new mount is specifically designed for conditions encountered in missiles and jet aircraft. The company believes the new mount will do much to improve avionic equipment reliability.

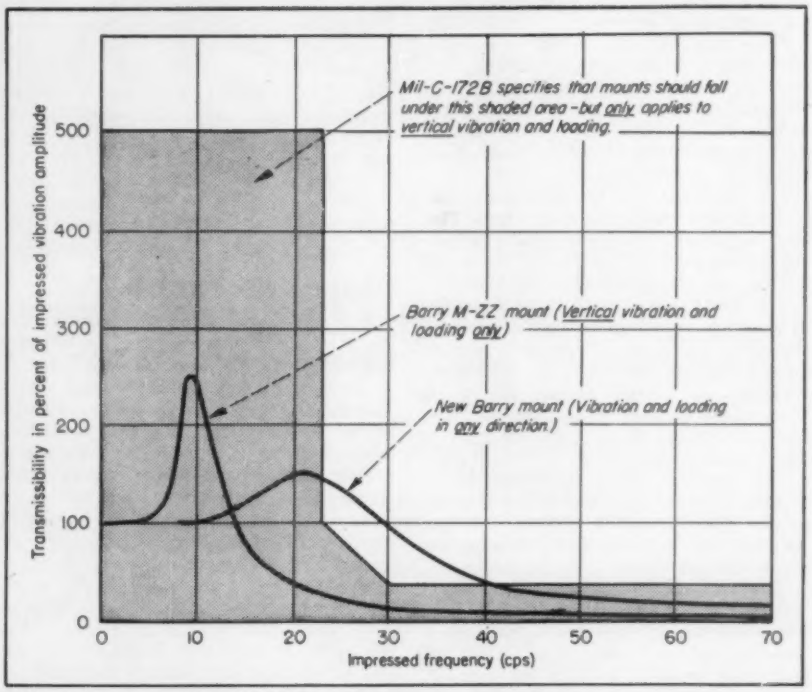
The new mount generally meets or exceeds the requirements of MIL-C-172B, except for natural frequency which runs higher than specified, but with good reason, according to Barry.

▶ **Two Big Advantages**—Here are two of the device's biggest advantages:

• **Low transmissibility** at resonance, provided by higher natural frequency and heavy damping, assures that avionic equipment will not be subjected to more than 150% of the missile or aircraft vibration under worst conditions. This compares with 500% amplification permitted under MIL-C-172B.

• **Multi-angle loading,** resulting from novel internal construction, enables the mount and its equipment to be installed in any convenient position, including bulkhead mounting. This is an important advantage in missiles and jets, whose flight attitudes range up to inverted flight.

▶ **Dissatisfaction With the Old**—It is no secret that some missile and avionics engineers have been dissatisfied with the performance of older types of isolation mounts for use in missiles and jet aircraft.



LOW TRANSMISSIBILITY of new mount gives less amplification of vibration in any position than permitted by MIL-C-172B or obtained from old mount for vertical loading.

A small barrage of letters on the subject was triggered when AVIATION WEEK reported a statement by Floyd A. Paul that hard mounting was preferable to isolation mounting for missiles. Paul, at the time with Cal Tech's Jet Propulsion Lab, made the recommendation at the 1953 Electronic Components Symposium (AVIATION WEEK June 15, 1953, p. 53).

Some of the letters came from missile contractors' engineers, calling for new improved mounts. Other letters, from isolation mount manufacturers, explained that they were largely victims of outmoded specifications. These specs, originally prepared in the early postwar period, were designed to handle conditions encountered in the slower piston-engine aircraft such as the B-36.

▶ **Revision Needed**—For instance, W. A. Keetch, vice president of Robinson Aviation (a major isolation mount manufacturer), called for "revision of obsolete or unrealistic specifications . . ." and wrote of the need for "higher resonant frequencies" (AVIATION WEEK Aug. 30, 1954, p. 47).

In another letter, Raymond G. Yae-

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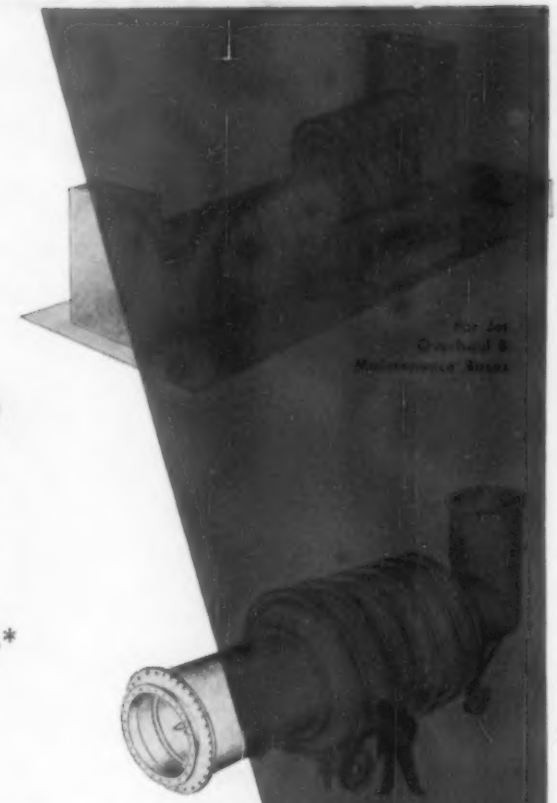

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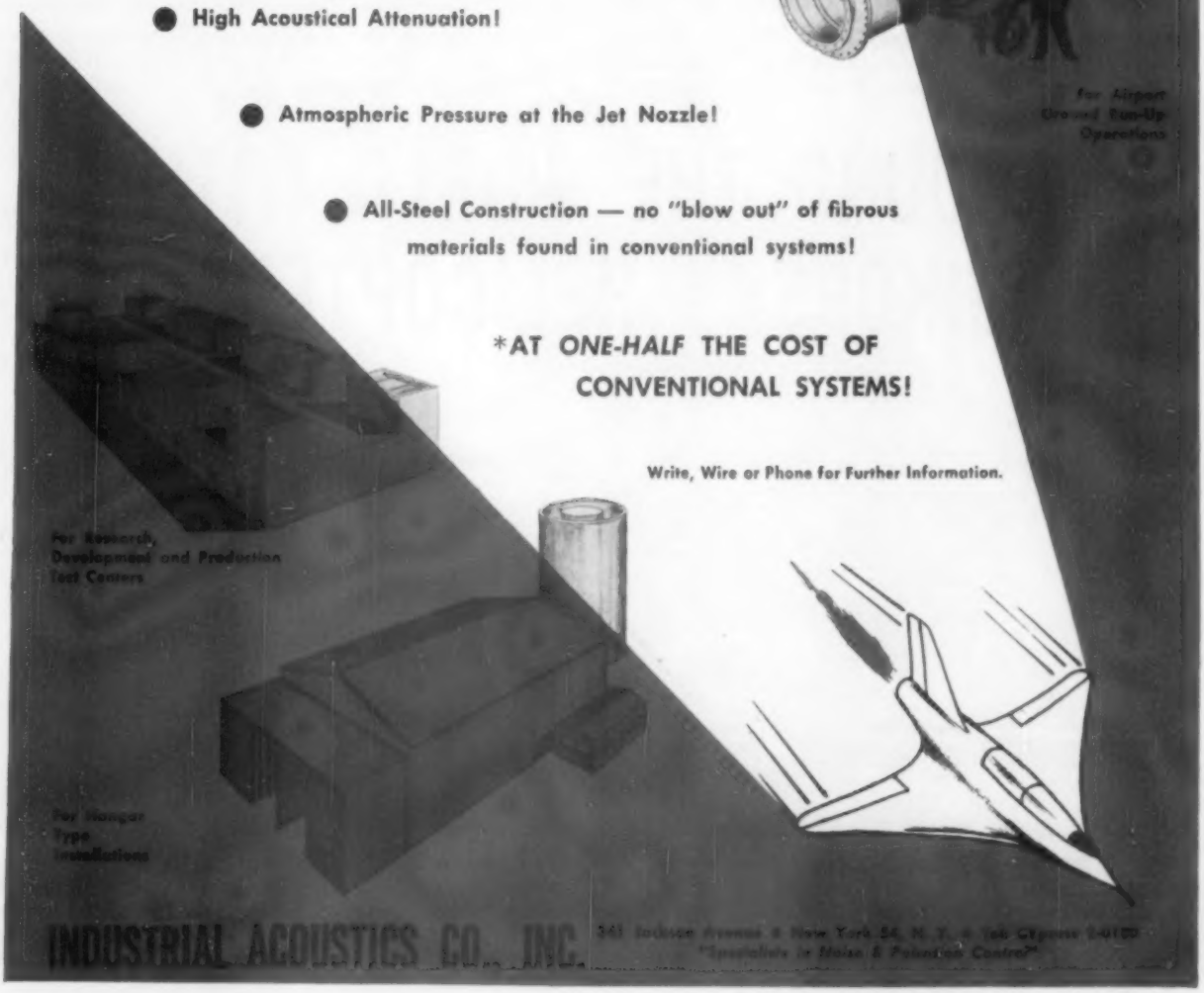

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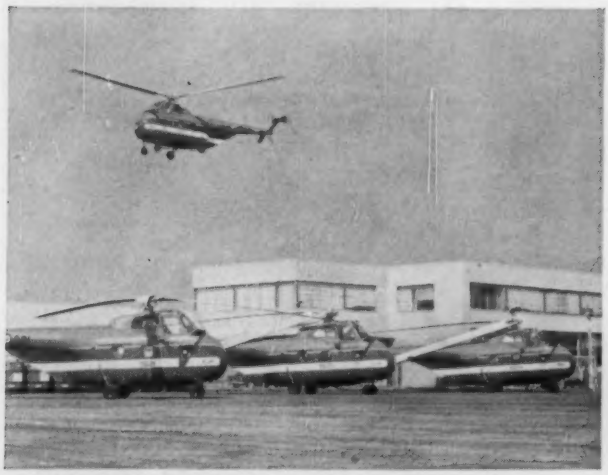
NEW SERVICE STARTS—Hostesses of five airlines—United, Western, Pan American, American and TWA—cut a ribbon to open Los Angeles Airways' first helicopter passenger route after eight years of scheduled mail operations. First passenger service is between Long Beach and Los Angeles International Airport, with Sikorsky S-55s.

AROUND THE WORLD WITH SIKORSKY HELICOPTERS

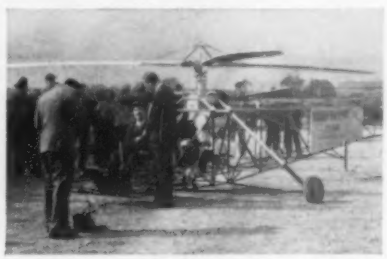


RCAF SIKORSKYS—First all-helicopter squadron in the Royal Canadian Air Force is now in operation with rugged Sikorsky S-55s. These wilderness-proved transport helicopters are now based at Bagotville, Quebec. Here are four of ten S-55s in the initial Canadian order. All were flown to Canada from Sikorsky's plant.

BRITISH USE S-55s—Helicopter passenger service between London Airport and Waterloo is scheduled to begin this spring. British European Airways will use S-55s for the flights, which take 18 minutes each way compared to more than an hour by surface travel. BEA pioneered helicopter passenger flights in 1950 with S-51s.

SERVICE EXPANDS—New York Airways has expanded scheduled helicopter passenger service both north and south from its New York City inter-airport routes. Cities added were Trenton and New Brunswick, New Jersey, on the south, and suburban White Plains, New York, and Stamford, Conn., on the north. Above, passengers board a Sikorsky S-55 at the heliport in Stamford.

America's First Truly Successful Helicopter —Sikorsky VS-300



MAY 20, 1940—First public view of Sikorsky's historic VS-300—America's first truly successful helicopter—came May 20, 1940 as Igor Sikorsky was awarded Helicopter Pilot License No. 1. The VS-300 was only the first of many Sikorsky achievements in advancing helicopter development and industry-leading production efficiency.

SIKORSKY AIRCRAFT

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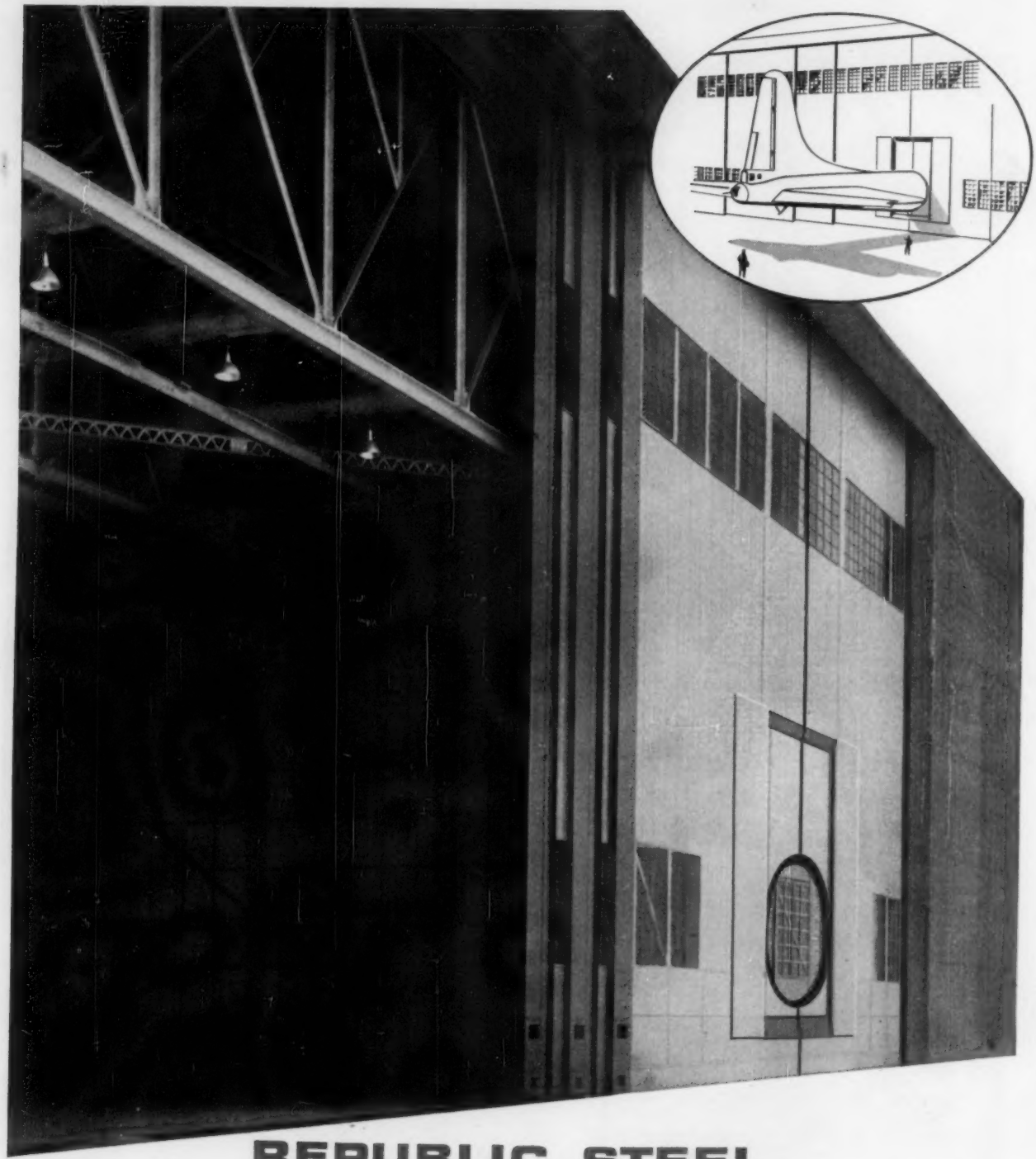
One of the Divisions of United Aircraft Corporation

Truscon builds this "Door



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58

ger, senior vibration test engineer at

within a Door" to help you service the biggest ships

Giant Truscon Steel Hangar Doors Close Snugly Around Fuselages

In these double cantilever maintenance-type hangars, pairs of giant Truscon Straight Slide Doors close snugly *around* fuselages of the big ships. Cutout door sections and ingenious sealing device allow efficient maintenance work in any weather, with the tail assembly *outside* the hangar. Cutout door sections can be designed to fit any type or size fuselage. Foam-rubber insert allows for height variations. Twin sliding panels close when no fuselage is in the opening.

This "door within a door" provides a snug seal without damage to fuselage or tail assembly. Straight Slide Doors can be 35 to 40 feet wide, and 65 feet or more high. Fully open, a clear space 350 to 650 feet and more, in width, is possible.

Truscon makes hangar doors to fit every need, every size opening. All are products of nearly thirty years' *specialized experience* in big-door design and construction. Send coupon for details and specifications describing Truscon Straight Slide Steel Hangar Doors and other major types.

RUNWAYS STAY WATER-FREE when Republic Toncan Drainage Products are on the job. Here, Toncan Iron Sectional Plate Arch-Pipe is being installed at Cleveland Lakefront Airport. Toncan is an alloy iron. Copper and molybdenum help it resist rust better than any ferrous material in its price class. Send coupon for name of your nearest Toncan Iron Culvert manufacturer.

REPUBLIC ALLOY STEELS CUSHION 180-TON WALLOPS! This shock-absorbing landing strut is made of alloy steel. Struts like this help cushion the impact as the big ships wallop runways at 100 mph. plus. Here's proof in action that vital parts needn't buy safety with sheer weight. Republic, world's largest producer of alloy and stainless steels, will help you apply these "fighting metals with safety factors", help you put the right steel in the right place.

REINFORCED CONCRETE RUNWAYS STAY SAFER, LAST LONGER. Runways reinforced with steel bars or welded wire fabric resist cracking, are less likely to deteriorate, to suffer from water and freezing damage, and require less maintenance. Republic's Truscon Steel Division pioneered in reinforced concrete, now offers immediate delivery of reinforcing bars and welded wire fabric through a nationwide warehouse service.

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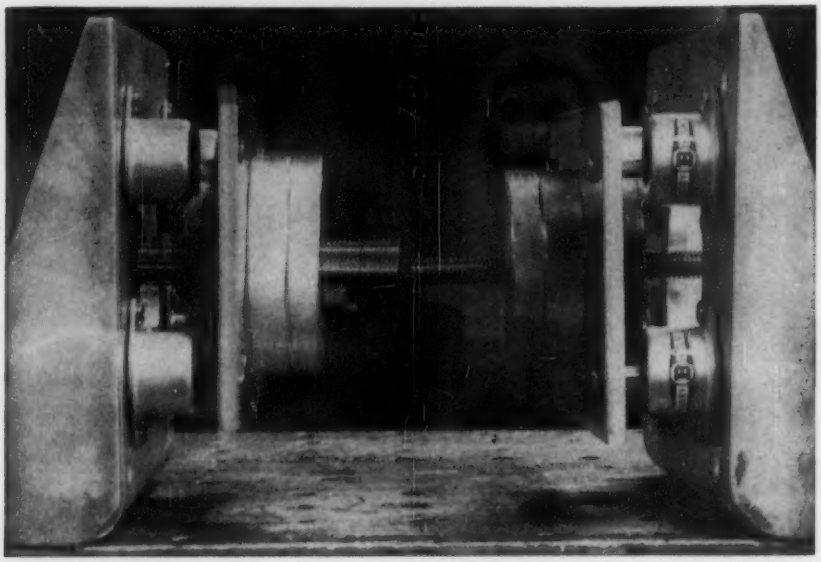
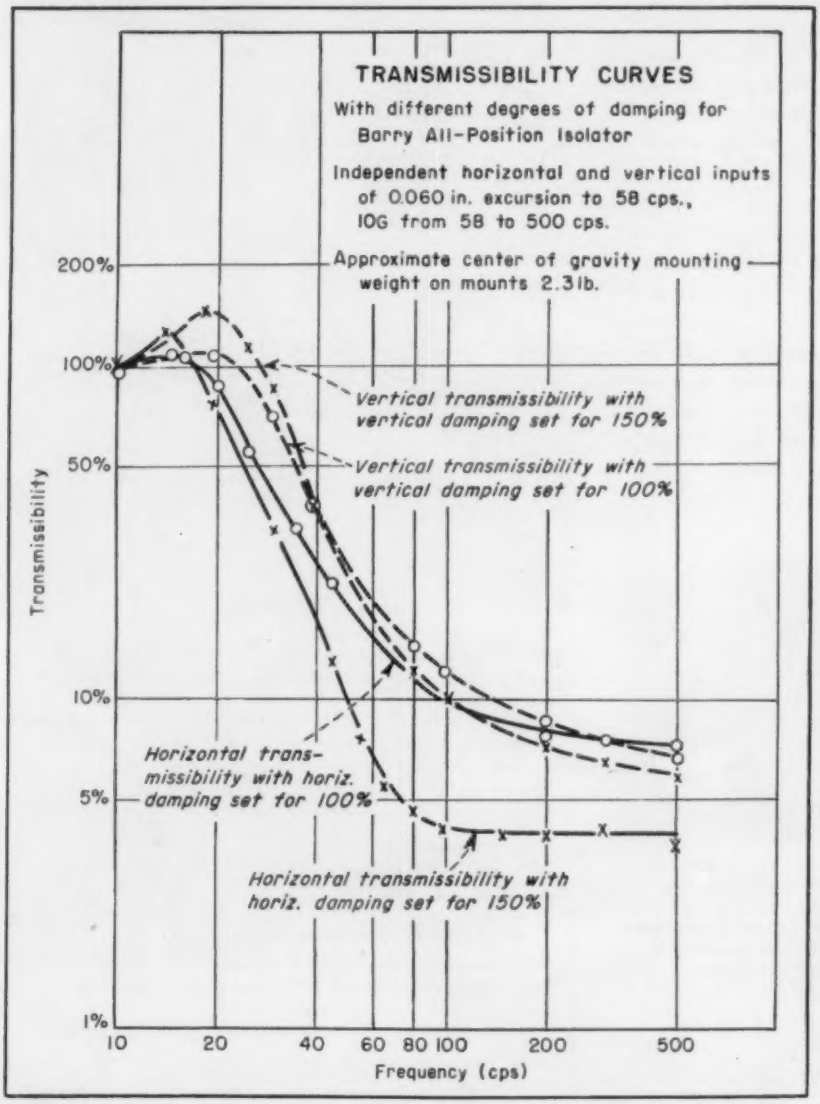


SHAKE TABLE shows relative effects on horizontally mounted isolators (new one, right).



EFFECT OF CHANGES in damping on transmissibility of new mount is shown above.

ger, senior vibration test engineer at Bell Aircraft Corp., said that "the advent of the guided missile and the rocket powered aircraft has forced changes in the concepts of isolator design" (AVIATION WEEK Oct. 25, 1954, p. 69).

Yaeger called for redesign of present low-frequency mounts so that they have a transmissibility of no more than 300% at resonance and so that they can operate under the following conditions:

- **Steady state flight accelerations** of 5G or more in all three planes.
- **Flight attitudes at all angles** up to and including complete inversion.
- **High temperatures** up to 300F.
- **Highly oxidizing atmosphere** created by rocket propellants.

The new Barry mount appears to meet or better the requirements which Yaeger cited.

▶ **Break With the Past**—Barry's decision to depart from the MIL spec requirement that mounts have a natural frequency lower than 15 cps. was made following discussions with major aircraft and missile manufactures, which confirmed its own analysis of what was needed. Barry learned that one missile maker had switched to shipboard-type isolators (with 30-cycle frequency) with excellent field results.

Several airframe companies, after analysis of the vibration and shock problems encountered in their jet aircraft, were calling for 20-30 cycle mounts, Barry found.

▶ **The Result**—The result of this survey, and subsequent design efforts, produced a new isolation mount in which the vertical load carrying member is supported on two conical springs midway in its total travel (see sketch and photo, p. 54).

As the load member moves vertically, it carries with it a large nylon washer which rubs against the metal shell to provide friction damping. A girdle spring in the nylon damper maintains constant pressure against the metal shell and compensates for any wear resulting from use.

The same two conical springs serve to cushion lateral vibration of the load-carrying member, with steel washers sliding across the surface of the nylon damper to provide lateral damping action.

A molded nylon piece on the bottom of the shell, and a nylon washer at the top, serve as snubbers to prevent metal-to-metal contact when the isolator bottoms under severe shock. This reduces the shock effects transmitted on to the equipment.

▶ **Adverse Operating Conditions**—Although Barry has not yet established a firm operating temperature range for its new mounts, pending further tests, it says they can be used over the MIL-

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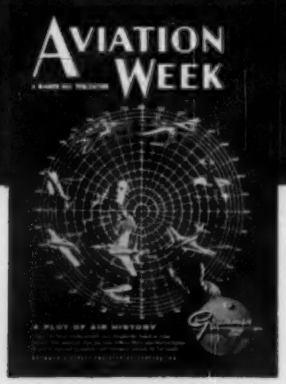

AVIATION

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in the AGE OF PERIL

22nd Annual Aviation Week

MARCH 14, 1955

"Inventory of Airpower" Edition

will cover vital aviation subjects on global scale

AVIATION WEEK'S 22nd ANNUAL "INVENTORY OF AIRPOWER" EDITION—"Airpower in the Age of Peril"—covering every phase of U.S. civil and military aviation, and providing the latest information on foreign airpower, will be published March 14, 1955. Featuring the complete story of the transition from the Korean crisis buildup to the solid industrial and airpower base necessary to meet the requirements of U.S. Policy over the long pull, this important issue will hold significant and lasting interest throughout the aviation world.

Aviation management men, engineers, military and government officials will read, refer to and depend upon "Airpower in the Age of Peril." Only in this edition will be found full information on fiscal 1956 federal aviation budgets, new procurement and financing regulations . . . ground rules that will guide Air Force and Navy policy in doing business with the aviation industry over the next two years, as well as latest reports from AVIATION WEEK correspondents in every part of the world on significant developments abroad.

Reference tables especially designed for "Airpower in the Age of Peril" will give new, revised specifications on U.S. and foreign aircraft, missiles, and engines. Special reports will cover the expansion of the guided missiles industry, the conversion of domestic and international airlines from piston to gas turbine powered equipment (including full statistical coverage of all U.S. and foreign airline operations), the expanding role of equipment and component manufacturers in the weapons system development and production cycle, and avionics in military and civil aviation. This storehouse of vitally needed aviation information will be used constantly wherever aviation business is transacted.

This extremely great usefulness to the aviation industry gives "Airpower in the Age of Peril" prime importance as an advertising medium. Aviation companies and their suppliers will find the long-lasting selling power of this significant AVIATION WEEK issue unmatched in aviation publishing today.

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Designed for research into problems of very high speed flight

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Martin "404"—COURTESY OF THE GLENN L. MARTIN COMPANY

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With the same effectiveness, LORD VIBRATION CONTROL enhances the performance of all types of mechanical equipment—providing quieter, more efficient operation.

The distinct advantages of LORD VIBRATION CONTROL systems are the result of three important factors. First is LORD's extensive knowledge of vibration causes, effects and control gained through 30-plus years of experience devoted exclusively to this field.

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DESIGNERS AND PRODUCERS OF BONDED RUBBER PRODUCTS SINCE 1924

C-172B range of −55C to 85C without adverse effects on performance.

The company believes the present mount construction may be usable up to 150C, and by substituting Kel-F for nylon, it hopes to raise the top temperature to 200C. The use of Kel-F also will enable the device to withstand corrosive fumes from rocket engines, Barry believes.

Company tests to date indicate that soaking the isolators in oil and water has no noticeable effect on performance, Barry says.

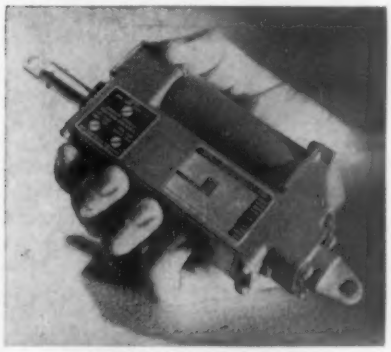
▶ **Wide Range Characteristics**—By varying certain parameters, such as spring gradient, the mounts can be given a wide range of natural frequencies (15 to 30 cps. or higher) and damping. It is possible, for instance, to give the isolators a maximum transmissibility as low as 100% at resonance. However, standard models will have 150%.

By compromising on a slightly higher (150%) transmissibility at resonance, instead of using sufficient damping to obtain 100%, the mount gives better isolation (lower transmissibility) at higher frequencies above resonance. Interesting feature of the mount design is that horizontal and vertical transmissibilities can be set independently of one another.

A comparison of isolation efficiencies specified in MIL-C-172B and those obtained with the new Barry mount, as well as an older model, is shown on page 54.

▶ **Load Range**—Because of the new mount's construction, it is a little more difficult to define the load range of each size and model of isolator.

The mount rests in the middle of its range of travel so that there is no physical limit on the minimum load which can be handled. However, the



Powerful Midget

Lightweight linear actuator, half as heavy as its predecessors, has been developed by AiResearch Manufacturing Co. The 1.16-lb. actuator, containing built-in radio noise filters, limit switches, and magnetic brake, delivers up to 150 lb. force, can withstand static load of 500 lb. in tension or compression.

● Demands for more precise flow measurement in aeronautical research have brought about the adoption of the Potter Flow Meter throughout the aviation industry. Fuels, oils, propellants and other fluids are being metered with ± ½% accuracy in laboratory experimentation and in actual prototype flight testing with light, compact Potter Flow Meters.

The unique Potter Flow Sensing Element is inherently linear, has a high response speed, and can be quickly, easily installed in any position. Output signal (an alternating current whose frequency is directly proportional to the flow rate) can be telemetered, fed to digital handling systems or measured directly to indicate, record or control flow rate or total.

Inquire about Potter Flow Meters for engine and prototype testing, hydraulic research and for production aircraft.

Write for Bulletin AF-1.

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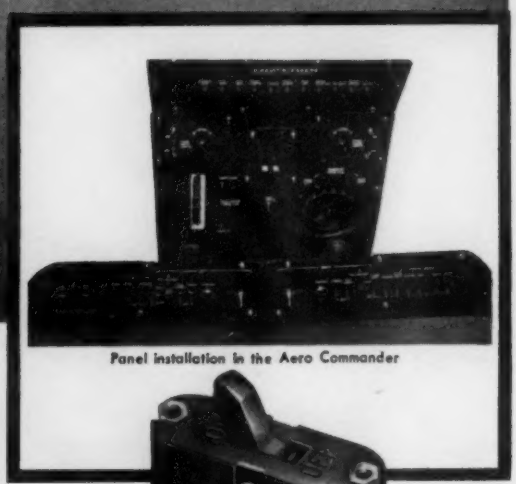

Panel installation in the Aero Commander

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Circuit Breakers

Klixon Circuit Breaker

The modern twin-engine "Aero Commander 560," manufactured by Aero Design and Engineering Co., Bethany, Oklahoma, is an ultra deluxe executive transport that is setting records in performance and passenger comfort.

To insure maximum safety, Aero Engineers use Klixon PSM and C6363 circuit breakers to protect the electrical circuits.

Here's what they say —

"The Aero Design & Engineering Company specifies Klixon Circuit Breakers for dependability. The Aero COMMANDER twin-engine executive plane must give dependable service to its owners and Klixon Circuit Breakers have proved to be dependable and also maintenance and service free."

Performance records in all types of planes prove Klixon Breakers are outstanding for dependability.

They withstand shocks and vibration far in excess of the values normally encountered. They are precisely calibrated and individually tested for ultimate trip and 200% load tripping characteristics to assure dependable protection. Write for data giving complete details.

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load will determine the isolator's natural frequency—the lighter the load the higher the frequency. Hence the desired natural frequency may determine the practical limit on minimum load for any individual application.

The maximum load will depend upon the natural frequency desired as well as upon how close to the snubbers the mount can be loaded under static conditions and still have sufficient travel to accommodate the vibration which will be encountered. The latter consideration is the more critical of the two.

► **WADC Gets a Look**—Barry recently demonstrated its new all-position mount to engineers from several Wright Air Development Center laboratories. The company had conducted a similar demonstration several months earlier for a few select missile manufacturers.

Company officials report an enthusiastic reception, both from industry and WADC engineers, despite the fact that the new isolator does not meet the low natural-frequency specs of MIL-C-172B.

► **In Production**—Barry currently is in production on MIL-Size 0 (0.1 to 3 lb./isolator) mounts and expects to be producing MIL-Size 1 units (0.5 to 9 lb.) early this summer. Production of Size 2 isolators (2 to 40 lb.) will follow shortly thereafter.

Meanwhile, the first shipment of production isolators has gone out to Chance Vought Aircraft, which is evaluating them for possible use on the Regulus missile.

Application engineering data on the new all-position mounts can be obtained from Barry Controls Inc., P.O. Box 215, Watertown 72, Mass.

Sylvania Plans Center For Data Processing

Sylvania Electric has announced plans for a company-wide electronic data processing center, built around a Remington Rand Univac, one of several expansions recently disclosed by members of the avionics industry.

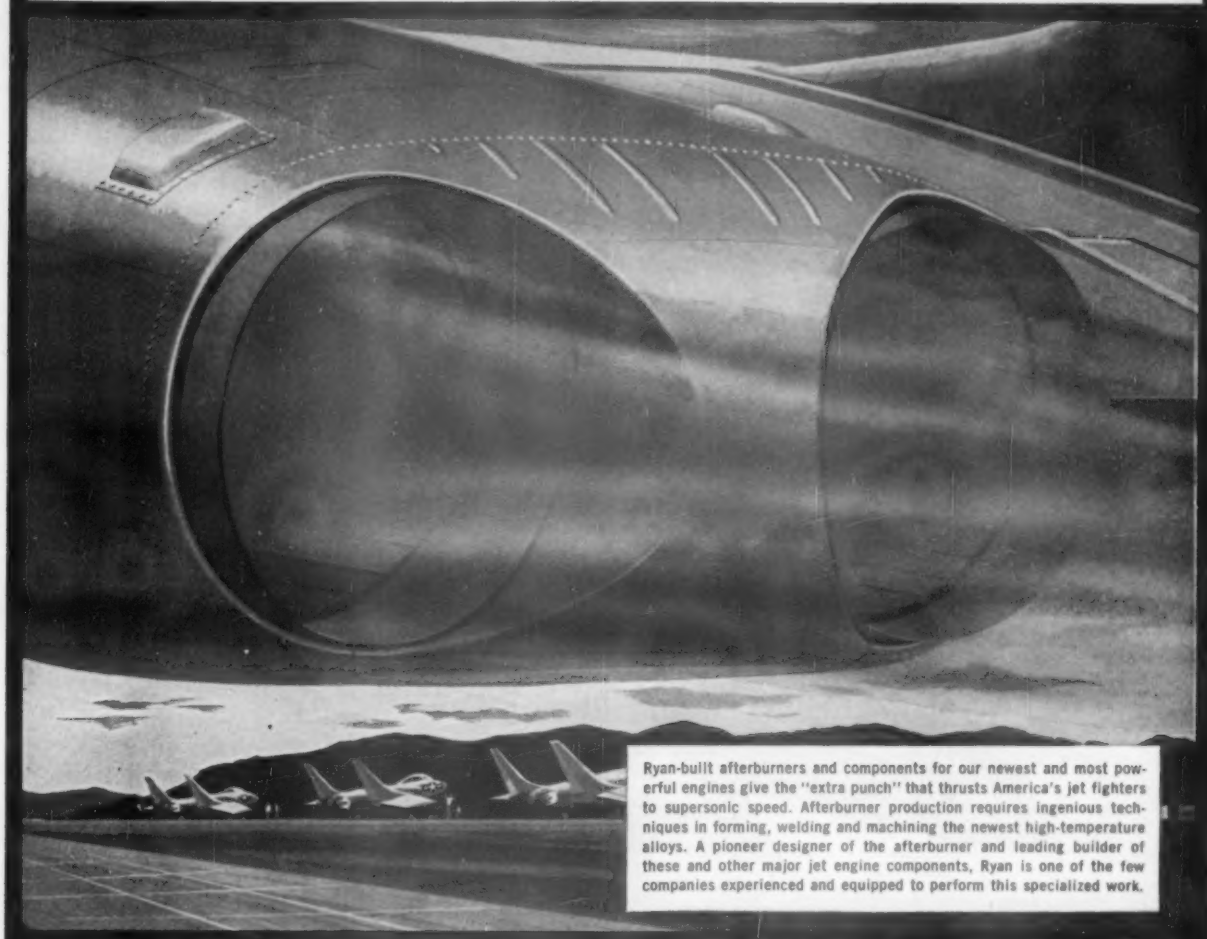
The new data processing center, slated to be in partial operation by January 1956, will be linked by wire to six area reporting offices, each of which in turn will be fed production and financial information by four to six facilities within the area. Sylvania now operates 45 plants and 12 labs in 11 different states.

Other avionics industry expansions include:

• **Litton Industries**, Beverly Hills, Calif., has purchased U. S. Engineering Co., Glendale, Calif., maker of etched circuitry and electronic hardware.

• **Radio Corp. of America's** new systems engineering lab (AVIATION WEEK

RYAN AFTERBURNERS BLAST U.S. JETS AHEAD



Ryan-built afterburners and components for our newest and most powerful engines give the "extra punch" that thrusts America's jet fighters to supersonic speed. Afterburner production requires ingenious techniques in forming, welding and machining the newest high-temperature alloys. A pioneer designer of the afterburner and leading builder of these and other major jet engine components, Ryan is one of the few companies experienced and equipped to perform this specialized work.

Another Example of How

RYAN BUILDS BETTER

Because Ryan has tackled and licked the difficult, challenging jobs of the jet age, leading engine makers not only depend on Ryan for production of current models but also for new product development and initial manufacture of complex components for power plants of entirely new design. The only jet parts maker that also designs, builds and flies jet aircraft, Ryan has proven its ability to build to jewel-like precision the "hot parts" and major components for jet, piston, rocket and ramjet engines.

And in other fields, too – aircraft design, airborne electronics, drone missiles, basic research and development – Ryan has demonstrated the know-how which comes only from a background of 32 years in building planes and aeronautical products. Ryan's deserved reputation is built on producing only the best, delivering on time, and at minimum cost.

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Fuel Gage for the first Turboprop Airliner to go into service in North America

To obtain the aircraft best suited to their operational requirements, Trans-Canada Air Lines and Capital Airlines chose the Vickers Viscount turboprops. And to insure the ultimate in accurate and proven fuel gage systems, both lines have chosen the Simmonds Pacitron Lightweight Fuel Gage System.

Now to its long record of firsts in fuel gage development, Simmonds is proud to add the installation of Pacitron on the first turboprop airliner to go into service in North America.

In addition to dependable fuel measurement, the Pacitron Lightweight Fuel Gage System also makes possible the addition of important functions of fuel *management* and control. These include: automatic center of gravity control (i.e. control of fuel weight distribution), low level switching (thermistor level switches), and automatic load limit control in accordance with the flight plan.

Simmonds fuel gaging systems are now flying on 90 types of aircraft and on 40 U.S. and foreign flag airlines — a record for which Simmonds is recognized the world over as "first in electronic fuel gaging".

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Dec. 20. p. 7) will be located in Waltham, Mass., at 225 Crescent St., in a building leased from the Waltham Watch Co.

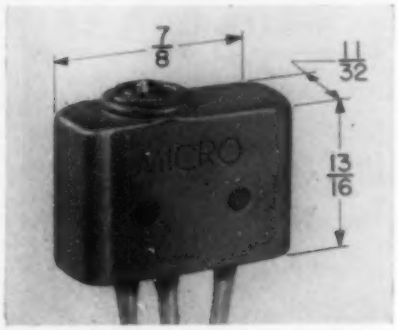
• **General Electric** has formally opened its new 100,000-sq.-ft. systems center in Syracuse which will serve as headquarters for its Heavy Military Electronic Equipment department's development and manufacturing operations. HMEE department's activities include work on air defense radar systems.

• **Radar Technical Commission for Aeronautics** has elected five new members. The new members are: Bayaire Avionics, Inc., Oakland, Calif.; Haller, Raymond and Brown, Inc., State College, Pa.; Continental Air Lines, Denver; Mohawk Airlines, Inc., Ithaca, N. Y.; Northrop Aircraft, Inc., Hawthorne, Calif.

Avionics' Firms Tell of New Components

A tiny new environment-proof switch —the smallest and lightest sealed, precision snap-action switch available, according to its maker, Micro Switch—is one of several recently announced avionic components.

Designated 1SE1, the switch is designed for operation between −65F and 180F and has a minimum life expectancy of 300,000 operations, based on lab tests to date. Tentative rating is 30 v. d.c., 2½ amp. inductive, 4 amp. resistive, 15 amp. maximum inrush. Switch comes in SPDT or SPST styles, either normally open or closed. Data sheet P96 gives application data. Company's address is Freeport, Ill.

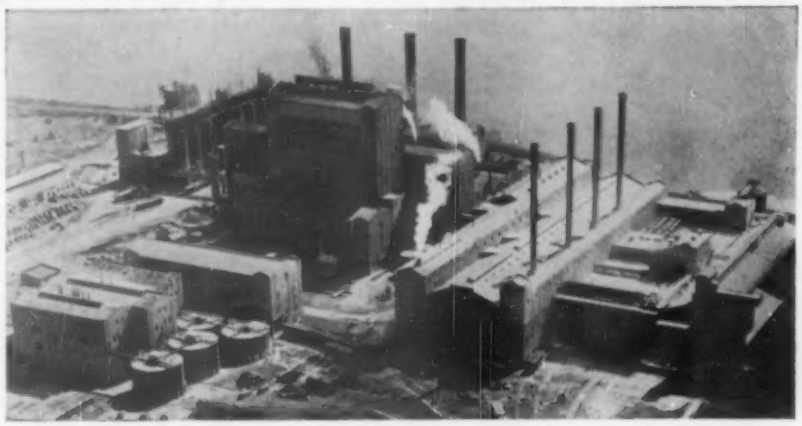


NEW SWITCH—Smallest and lightest?

Other new components include:

• **High-voltage sealed rectifiers,** selenium type, designed to withstand rigors of airborne use, are available for a wide range of input voltages. Typical unit is rated 3,300 v. rms. input, 1,420 v. d.c. output, 1¼ ma. at 35C ambient into a resistive load. At 71C, unit delivers 1.2 ma. at 1,360 v. d.c., from 2,130 v. rms. input. Unit measures 5⅛ in. long by ⅝ in. in diameter. Bulletin H-2 gives application data. International Rectifier Corp., 1521 E. Grand

From Wyandotte . . . answers to modification & maintenance problems



North Plant (above) on the Detroit River is part of Wyandotte's vast manufacturing facilities. Here, and at Wyandotte's newest plant in Los Nietos, Calif., specialized products for the aircraft industry are manufactured.

	YOUR PROBLEM	ANSWER	DESCRIPTION
1	Steam cleaning	Altrex*	Cuts scale formation; removes all types of soil from aircraft exteriors, decks, engines.
2	Emulsion cleaning	1-2364	Meets USAF Specification 20015-E and MIL-C7122 (Aer). Will not craze plastics.
3	Carbon removing	P-1075	Nonflammable, noncorrosive cold-tank carbon remover for jet- and piston-engine parts.
4	Integral fuel-tank desealing	2789	A "universal" desealant for removing all types of sealing compounds. Nonflammable.
5	Removing exhaust stains	#20	Removes stubborn exhaust stains; prevents corrosion in exhaust-stained areas.
6	Washing aircraft exteriors	Aerowash LR231	An excellent emulsion cleaner for regular aircraft maintenance.
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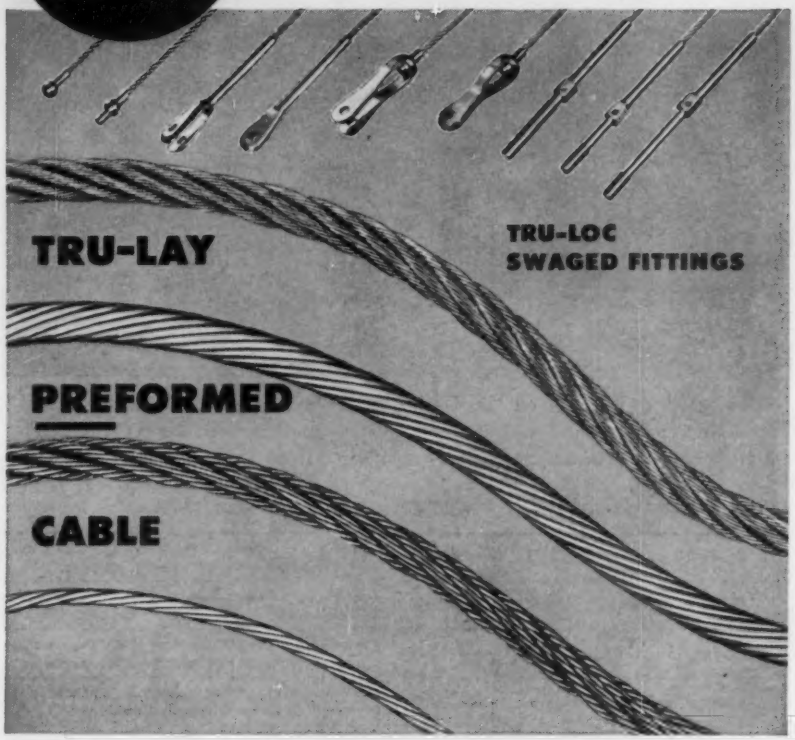

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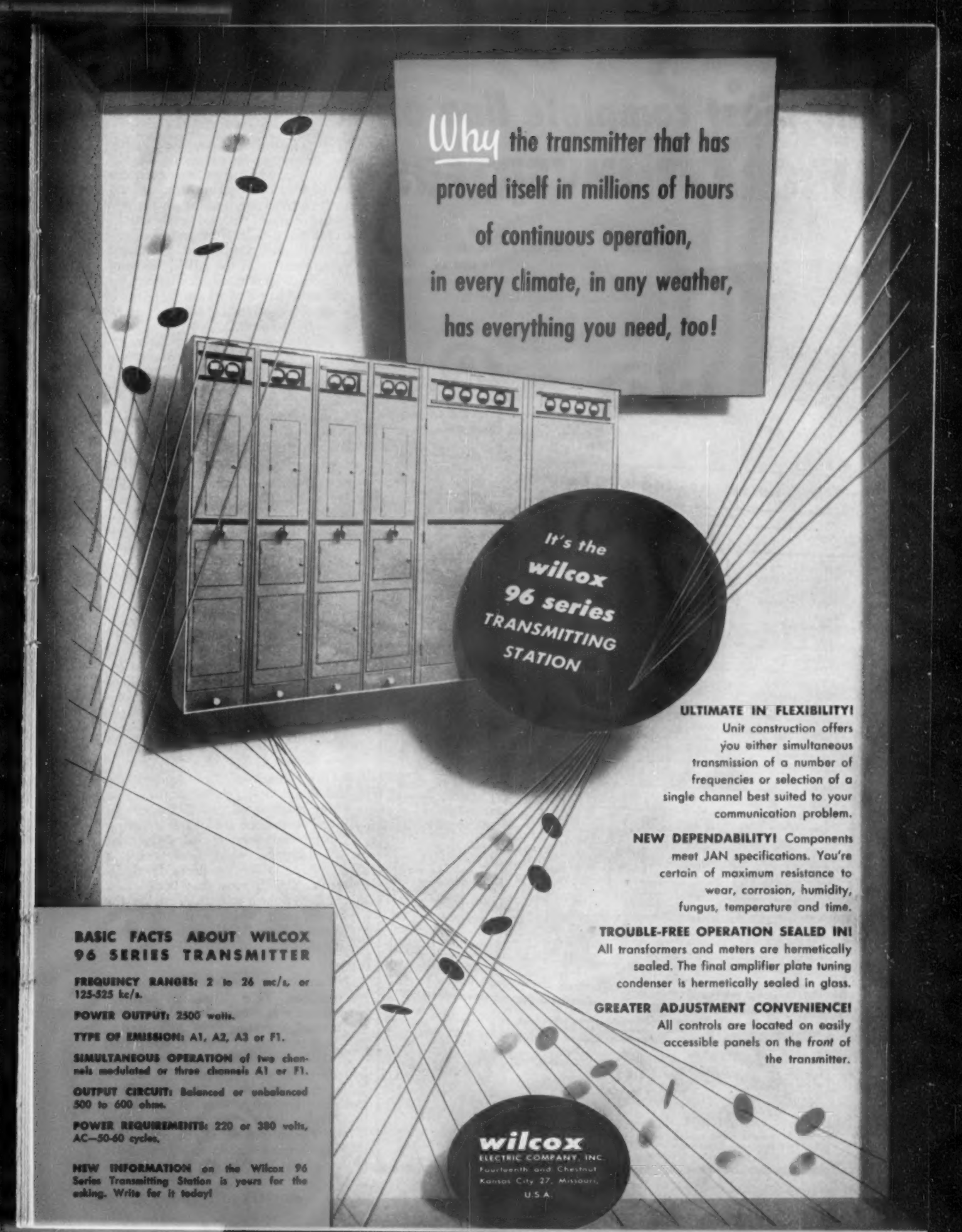
Company's address: 640 West Mt. Pleasant Ave., Livingston, N. J.

FILTER CENTER

► **Novel Microwave Amplifier**—"Scalloped beam amplifier," a new type of tube developed by General Electric for amplifying microwaves, employs an electron beam of periodically varying diameter down which the microwave signal travels. GE says amplification is achieved without external circuitry.

► **Radically New Yaw Damper**—Boeing reportedly has developed a radically new type of yaw damper for the B-52 which uses neither rate gyros nor accelerometers. One observer reports the device is so simple that "it would even frighten Ed Heinemann."

► **AGCA Problems**—Cross talk between the azimuth and elevation control signals in the radio data link used in automatic GCA appears at present to limit the dynamic performance of AGCA. This observation was made in a paper by Dunstan Graham and Richard Lathrop, Wright Air Development Center engineers, presented before the recent national IAS meeting in New York. The authors reported that the introduction of ground-computed rate signals and increase in computer passband causes amplification of radar scan-rate noise and an incompletely explained ½-cycle interference. In one test using a plane equipped with autopilot and coupler, it was reported that the ailerons were de-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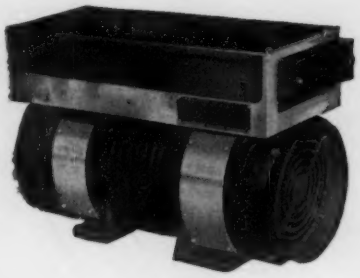

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Type	INPUT Volts	INPUT Amps.	OUTPUT Volts	OUTPUT Phase	OUTPUT VA Rating	Approx. Weight Lbs.	Max. Alt. Feet	Designed to Government Part No.
12128	27.5	1	26	1	6	2.2	35000	AN3496-1
12126	27.5	2	26	3	10	2.3	35000	N1020-SK
MG-93	27.5	12	115/200	1	100	10	65000	E-5134
				3	100			
MG-54	27.5	22	115/200	1	250	17	65000	E-5109
				3	250			
12142	27.5	22	115	1	250	13	35000	E-1617
				3	250			
12146-1	27.5	22	115	1	250	13	35000	53B6239
12146-2	27.5	22	115	3	250	13	35000	AN3532-2
MG-60	27.5	22	115	1	250	17	50000	53B6239
MG-62	27.5	22	115	3	250	17	50000	AN3532-2
32E01	27.5	35	115	1	500	26	50000	AN3533-1
				3	500			
32E00	27.5	37.5	115	1	500	34	50000	AN3534-1
		51.5		3	750			
MG-65	27.5	50	115/200	1	750	35	50000	E53805
		52		3	750			
1518 Mod. 1 & 2	27.5	105	115	1	1500	37.5	20000	—
		126		3	1800			
1518 Mod. 5	27.5	105	115	1	1500	37.5	35000	—
		126		3	1800			
MG-81	27.5	180	115/200	1	1600	61	65000	E1725
				3	1800			
32E06	27.5	150	115/200	1	2250	56	50000	E1725
		160		3	2500			
MG-70	27.5	170	115/200	1	2250	54	65000	—
				3	2500			
MG-61	27.5	170	115	1	2500	54	65000	53C6767
MG-64	27.5	170	115	3	2500	54	65000	—
32E03	27.5	160	115	1	2500	61	50000	53B6227
MG-95	27.5	150	115/200	1	2500	54	50000	E54807
		160		3	3000			
32E09	27.5	180	115/200	1/3	2500/3000	60	50000	—

NOTE: D.C. input voltage shown is a nominal value of 27.5 volts, but all units are designed to operate from 26 to 29 volts. Input amperes shown are values at 27.5 volts input.

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flected from stop to stop in synchronism with the spurious ½-cycle noise.

▶**New Transistor Chopper**—A static type of chopper for converting d.c. signals to a.c., which uses transistors, can be operated at frequencies up to hundreds of kilocycles, opening up the possibility of servos with extremely fast response time, A. P. Kruper of Westinghouse Electric Corp. told the recent winter meeting of the AIEE. Some of the advantages of transistor choppers, according to Kruper, include:

- **Low-level operation** at signals of a fraction of a millivolt.
- **Wide temperature range** operation between −50C to 90C with germanium transistors.
- **Small size, weight,** and power consumption.
- **Long life,** compared to mechanical choppers, where contact pitting and burning may be a problem.

▶**PGANE Sessions Scheduled**—IRE's Professional Group on Aeronautical and Navigational Electronics has scheduled three technical sessions during the national IRE convention in New York, two at the Waldorf-Astoria on Mar. 22, the third on Mar. 24 at Kingsbridge Armory. Some of the papers slated for presentation include:

- **A Communication Theory Approach Toward The Design of Aircraft Instrument Displays.**
- **Versatility of Floated-Type Rate Integrating Gyros in Systems Applications**
- **High-Precision Computer for Automatic Solution of the Celestial Triangle.**
- **Jainco: A High Precision Lightweight Aircraft Navigational System.**

▶**UAL Evaluates Radars**—Bendix Radio and Radio Corp. of America are anxiously awaiting results of United Air Lines' evaluation of their respective C-band storm-warning radars. Outcome will determine which firm pockets a $4-million order for fleetwide equipments. RCA's radar has been under test for about a month. Tests on the Bendix radar, which is slightly higher powered than RCA's, will get under way shortly.

▶**Transistor Frequency Standard**—American Time Products has announced a new transistorized frequency standard, operating from 20-35 v. d.c., which puts out 5-7 v. a.c. at 400 or 500 cps. Device weighs 7 oz., comes in an octal-based can measuring 1½ in. dia. by 4½ in. long, and is available in three different models, one of which reportedly holds its frequency within 0.005% between −65C and 85C. Manufacturer's address is 580 Fifth Ave., New York 36, N. Y. —PK

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This compact, light-weight rocket powerplant, designated by the U.S. Air Force as the LR63-AJ-1 liquid-propellant rocket, has been successfully flight-tested on the Republic F-84F airplane. Used for assisted-takeoff, this powerplant and its big brother, the YLR45-AJ-1, which was extensively flight-tested on Boeing's B-47B Stratojet during 1954, have proved the practical application of rocket power to piloted aircraft.

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ROCK NEWS, MONDAY, NOVEMBER 8, 1954

MAX CONRAD FLIES OCEAN WITH GULF

Breaks Record on Non-stop New York to Paris Flight In New Piper Apache

PARIS, Nov. 7—Max Conrad, San Francisco businessman and veteran solo flier, landed his twin-engine Piper Apache at an airfield near Paris today, ending the first non-stop crossing in a plane of such low horsepower since Lindbergh's famous flight in 1927.

The flight took just 22 hours and 23 minutes, setting a new record which beat Lindbergh's time by 11 hours and 6 minutes! During the flight, he used Gulf Aviation Products.

Mr. Conrad kept to his plotted schedule, flying on the regular course north to Boston, Novia Scotia, Yarmouth and Gander, Newfoundland, and going from Gander across the Great Circle route to Shannon and Paris. Shortly before his take-off, Mr. [illegible]rad had estimated that his fli[illegible]ake about 8 hours a[illegible]

Piper Apache used by Max Conrad on his transatlantic trip. This plane is powered by two 150-horsepower engines and cruises at 170 miles per hour.

"I've made five solo flights across the Atlantic in light planes," says Mr. Conrad, "and each flight has renewed my faith in the fine performance of Gulf Aviation Products. I know I can depend on them to get me through."

Before take-off, Mr. Conrad filled up with Gulf Aviation Gasoline, the gasoline that's "refinery-clean," because the pumps that dispense it are equipped with advanced *Micronic Filters* for your safety.

The oil used was Gulf Aircraft Engine Oil-Series R, which is recommended by aircraft engine manufacturers for all types of service. A famous, time-proved lubricant that retards sludge and carbon formation, and retains its body at high operating temperatures. This top-quality, straight mineral oil is used exclusively in all Piper aircraft on leaving the factory.

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Capital Busy Getting Set for Viscounts

By George L. Christian

Throughout its system, Capital Airlines is busy getting ready for operation of its fleet of soon-to-be-delivered Vickers Viscounts.

CAP's $67-million order for 60 Viscount turboprop airliners has set off a varied series of activities. For instance:

• **Fuel facilities.** A program is under way to install approximately $800,000 worth of kerosene fuel storage facilities at the 20-odd stations where the turboprop aircraft will be fueled.

• **Engine facilities.** Complete facilities are being installed for overhaul and test of the Rolls-Royce Dart turboprop engines used on the Viscount.

• **Brake study.** Capital is studying the question of installing a brake to stop the engines quickly to keep them from windmilling, something a turboprop engine does much more easily than a piston engine because of lack of compression.

• **Tool problem.** The airline is undecided as to what to do about the fact that entirely new wrenches, sockets and other tools will be needed by the mechanics to accommodate the European millimeter nut and bolt dimensions of the Viscount. Should the airline or the mechanics pay for the tools? Total cost will be about $10,000, Capital estimates.

► **Fueling the Viscount**—CAP recently signed a contract with Shell Oil for an undisclosed amount to supply kerosene (Shell Aviation Turbine Fuel) meeting specification DERD 2482 for its Viscounts. The kerosene will have to be segregated from standard gasoline fuels. The cost of approximately $800,000 for separate facilities includes not only the storage tanks but also handling equipment and tenders.

One-Type Fleet?

When Capital Airlines announced the purchase of first 40, then 60 Vickers Viscounts, it was generally supposed that the airline would attain the seldom-reached goal of a large carrier—a fleet composed of but one type of aircraft. On second look, this goal may not be so easy for Capital to attain.

The carrier will certainly have to retain several of its DC-3s for some time, because it operates into some fields that are too small to handle Viscounts with present runways.

The DC-4s—CAP, with 25 of this type, is the largest U. S. operator—are highly economical to operate, with Capital's vast backlog of experience in flying and maintaining the planes. So the DC-4s could prove to be highly attractive cargo carriers.

And the Constellations, of which the airline has 12, would undoubtedly be money-making tourist vehicles if converted to 82-passenger coach configuration.

So it will be interesting to see just how close Capital can come to the one-plane-type goal.

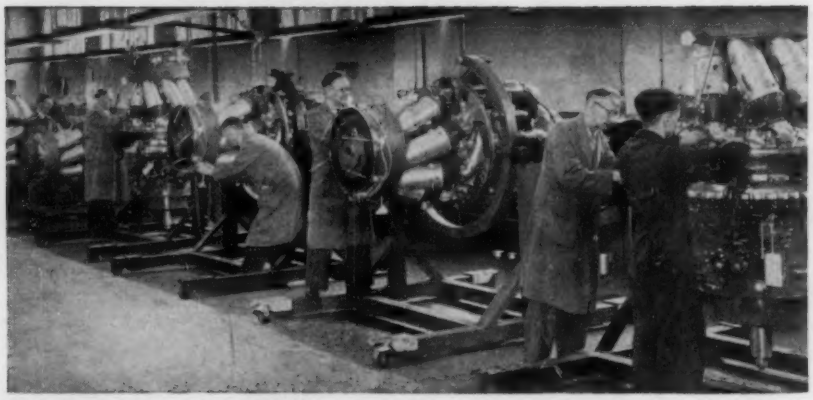
Offsetting this initial capital outlay is the per-gallon price of aviation kerosene—appreciably less than 91 or 100 octane aviation gasoline, says the carrier.

► **Oiling the Viscount**—The Dart powerplants will be lubricated with Esso Turbo Oil 35, a synthetic oil developed especially for high-temperature jets (Aviation Week Apr. 27, 1953, p. 72).

The breathtaking price of approximately $12-$14 a gallon (average cost of reciprocating engine oil is 40-60 cents a gallon) is almost entirely offset by the Darts' low oil consumption of ⅛ pint/engine or ½ pint/hr. for all four engines, according to Capital. (The Viscount which flew in the London-Christchurch, New Zealand, race in the fall of 1953 turned in consumption of a single pint of oil for the entire 12,200-mi. flight).

Esso technicians point out that oiling the Dart turboprop engine (which operates at relatively low temperatures and pressures) requires a complete change in thinking from conventional piston engine philosophy. In the latter, oil is regarded as a highly expendable item which is consumed in relatively large quantities by the engine (to the point where average oil capacities coupled with high oil consumptions have actually limited the duration of a flight) and frequently is changed one or more times between engine overhauls.

But with the Darts, Esso says: "Because the oil consumption of the Dart is so small as to be almost negligible and because the oil does not need to be changed between engine overhaul



DARTS ON THE LINE at Rolls-Royce Derby plant. Four Darts power the Viscount.

periods . . . which is now 1,050 hours on British European Airways' Darts . . . you should regard the oil in the powerplants as an engine part which requires changing only at engine overhaul."

► **Why So Low**—Here are the reasons Esso cites for the Dart's low oil consumption:

- **No contact of the oil** with products of combustion, as in a piston engine.
- **Temperature has no deleterious** effect on the oil, as it is well within the latter's operating limits.
- **Oil is tailored** for jet engine use.

The only actual loss of oil in the engine is from leakage past seals and by evaporation, says Esso.

Oil currently is lost, however, because of oil filter and propeller inspection. The former occurs at every 50 hours and results in a loss of 2.4 pints of oil. The latter inspection is performed every 200 hours and costs 9.6 pints of oil.

However, Esso says: "Airline operators are developing suitable methods for recovering this oil and re-using it, since it has been found that Esso Turbo Oil 35 does not undergo any appreciable change even after continuous use for the overhaul period of the Dart engine under airline operating conditions."

Esso adds that this lubricant is the only oil approved by Rolls-Royce for use in the Dart.

The Turbo Oil 35, as used in the Dart, may be "reclaimed," says Esso. The reclaiming process is merely one of removing contaminants by carefully filtering the oil. Principal contaminants are dust or dirt, ingested into the engine during normal operation, plus any metallic particles which may come from the engine itself.

Total oil capacity of the Dart is 25 Imperial pints.

Capital engineers estimate that oil costs of the Dart per engine operating hour will be substantially the same as for a comparable piston engine.

► **Engine Brake**—E. Guffey Erickson, Capital's Viscount project engineer, told AVIATION WEEK that the airline considers engine brakes a necessity for its Viscounts because the planes will be equipped with Airstair doors, starting with the fourth aircraft.

This means that passengers will be walking in front of and quite close to the propellers. So the airline wants to have a positive means of making sure that the props will not still be turning after landing (the Darts ordinarily windmill up to a minute after taxiing).

Capital also does not want to take the chance of a prop windmilling if the aircraft is parked headed into a strong wind while passengers circulate in front of the engines. Also, the brakes would keep the engines from turning over while mechanics work on or around them.

Vickers concedes that the Viscount's engines could windmill if the aircraft were heading into a strong wind. But as a practical matter, Vickers says, the probability of windmilling is slight because of the large reduction gearing (0.093) between prop and turbine—for every revolution of the propeller, the engine would have to rotate almost 11 times.

One point under debate at Capital is whether to equip all four engines with brakes or just the two port powerplants (since the Airstair door will be on the left side of the airplane).

► **Goodyear Brake**—One brake under consideration by CAP engineers is a single-disk-type Goodyear aircraft engine brake. The unit can be operated in several ways, such as electro-mechanically or hydraulically. If the latter, unit is provided with an accumulator, allowing brake pressure to be applied for extended periods of time.

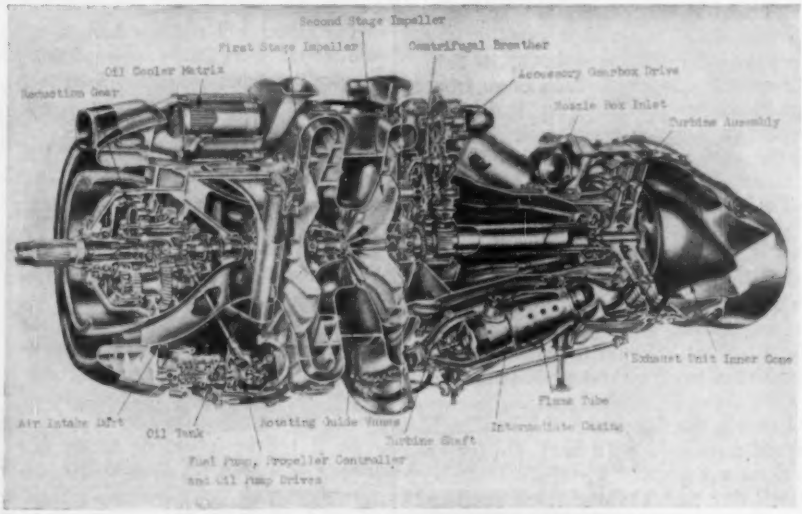
A problem of the brake from Capital's point of view is that it is designed to be mounted on an accessory drive pad. This means that all loads imposed on the engine by the brake are transmitted through the entire accessory section gear train to the prop shaft.

A Vickers representative told AVIATION WEEK that brakes are being contemplated in England for the Darts, although none is currently installed on existing aircraft. He expressed the belief that any brake eventually used on the Viscount would be a Rotol/Rolls-Royce-developed unit, because of the "intimate connection" between brake and powerplant.

► **Dart Test Cell**—An existing R2000 engine test cell at CAP's overhaul and maintenance base in Washington is being converted to Dart use to allow the airline to overhaul and test the turboprops. A converted, truck-type, mobile test stand is being built to take care of the R2000s.

An innovation in the Dart test stand installation is that an electronic dynamometer will replace the classic club prop to impose electrically any desired load on the turboprop powerplant and measure it simultaneously. The electronic dynamometer is more accurate, simpler and allows a cleaner installation than pivoted-engine torque-measuring means of checking a turboprop engine. BMEP gages obviously cannot be used with a turboprop.

The dynamometer requires consid-



CUTAWAY OF DART TURBOPROP ENGINE

erable cooling—approximately 1 gpm.

A. M. (Tex) Johnston (right), Chief of Flight Test, and R. L. Loesch, Senior Test Pilot, check the "707" before a test flight.

Boeing's jet transport is off to a good start

Day by day a big jet airplane is writing history in the sky over Seattle. The Boeing Stratotanker-Stratoliner has exceeded practically every expectation of its designers.

In the week following its first take-off, the 707 flew on six of seven consecutive days. By early October it had completed the entire first phase of flight tests, and today is far ahead of schedule. It handles well in the air, and fuel consumption has proved surprisingly low. Impressed by its performance, the Air Force has ordered a tanker version of the prototype airplane into production.

What lies behind the early success of this revolutionary transport? One factor is Boeing's unparalleled experience in designing and building multi-jet aircraft. Another is exhaustive research in the company's own trans-sonic wind tunnel, to achieve efficient airfoil and wing characteristics. And a third is sound production skill. The 707 incorporates many thoroughly tested features from other Boeing jet aircraft. For example, pod suspension of engines increases both safety and ease of maintenance.

The Stratotanker-Stratoliner inherits aerodynamic principles proved in more than a thousand Boeing six-jet B-47 bombers and in the eight-jet B-52 which now is in quantity production to become America's front-line heavy-bombardment weapon.

In addition, in the period since World War II, Boeing has produced more than 600 military C-97s and 56 commercial Stratocruisers. The C-97s perform almost all the aerial refueling operations of the U. S. Air Force. They also serve as high-priority personnel and cargo transports. The Stratocruisers are the acknowledged queens of transocean passenger service.

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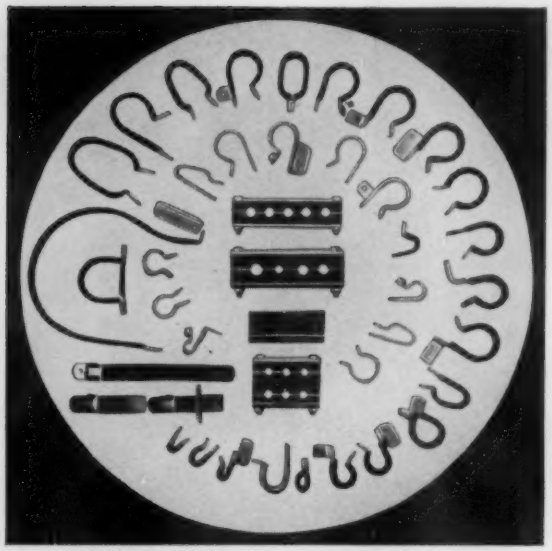
Cost Saving Ideas...



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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1927

erable cooling—approximately 1 gpm. of water for every 13 hp. absorbed. This means that maximum requirements of some 117 gpm. are needed to cool the unit when testing the Dart up to 1,500 hp.

The most economical way to obtain cooling water at these flow rates is to have a tower through which to circulate the water, according to Capital. Two electrically driven centrifugal pumps will move the fluid. In addition to erecting the water tower, the airline is also getting ready to install two sumps into which the water will be drained and stored when the water cooling system is not in use. This will prevent water from freezing in the tower during cold weather.

▶ **British-Built Equipment**—Although much of the equipment on CAP's Viscounts is American, several British-built components have been retained on the aircraft. Among them are three Roots blowers to pressurize the cabin. Maximum cabin pressure differential is 6½ psi. This gives sea level cabin pressure up to 15,000 ft. altitude and 8,000-ft. interior altitude at 30,000 ft.

Other British equipment on CAP's Viscounts includes Rotol propellers; Dunlop wheels, brakes and tires; Maxaret anti-skid devices, and Marconi ADF navigation equipment.

▶ **Why Marconi**—Here are the reasons Capital engineers gave for selecting English radio compass equipment although all other navigation and radio units on the plane are U. S.-made:

"The Viscount was designed for flush-mounted ADF antennas. . . . Several inquiries for ADF systems with flush-mounted antennas were forwarded to American manufacturers. They replied that they did not have anything in production at that time. One company gave an estimated date of May 1955 before it could produce one.

"This date was unsatisfactory for Capital, and close investigation of the Marconi ADF indicated the availability of flush antennas and their satisfactory operation with other Viscount users.

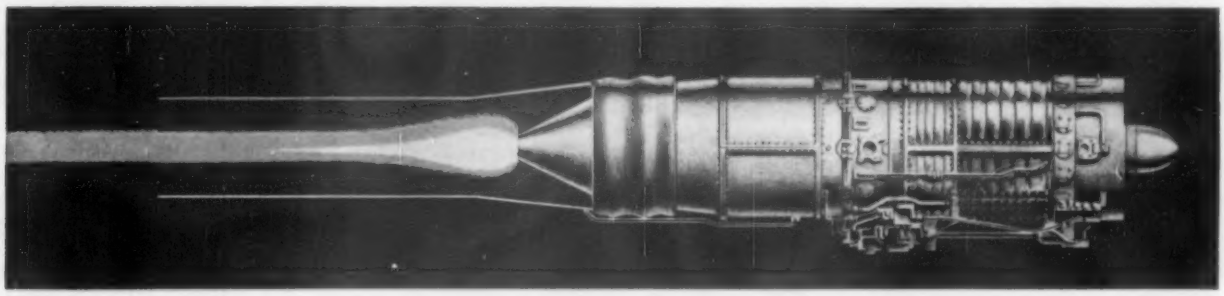
"Since the Marconi ADF is a compact and up-to-date system, Capital decided to use this unit in its Viscounts.

"We do not anticipate any parts deficiencies, as all electronic tubes, condensers, inductors, and resistors can be replaced with American parts. Other components, which cannot be replaced with standard American parts, will be carried by a Stateside Vickers warehouse. Therefore, any parts should be readily available."

▶ **Special Systems**—"Special systems" are incorporated in the Viscount which are not normally found on current-day airliners. Some of them:

• **Throttles and flaps.** A special tie-in system between throttles and wing flaps make it impossible for flaps to be in

BONUS THRUST: NO PENALTIES



The addition of extra thrust to new jet engines with a combustion device weighing only six pounds is one of today's major engineering achievements—the result of successful collaboration between Janitrol and gas turbine manufacturers.

Aside from its amazing light weight, chief features of the new Janitrol Post-Turbine Burner are ease and simplicity of installation, long life, high efficiency, and ability to be turned on and off repeatedly as required. In its present stage of development, this Janitrol combustion equipment gives the aircraft engine designer a new dimension of power – and current progress indicates a good potential for even greater power gains, with negligible addition of weight.

This development is a concrete example of Janitrol pioneering – another of Janitrol's many "firsts" which include the whirling flame heater, the radiant tube heating principle–hot rod wing anti-icing–purge gas generators–and the dimple plate construction of heat exchangers.

The background necessary for these contributions has not been acquired overnight: rather, it goes back over 50 years and spans many fields of combustion engineering, heat treating, high temperature metallurgy, fuel chemistry, and ceramics. We invite you to draw upon this unique fund of experience to help raise efficiency or save weight in equipment for heat generation, conversion, or transfer processes. Call on your nearby Janitrol representative early in the design stage.

50 years experience in combustion engineering

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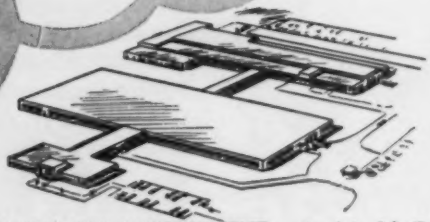

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DAYSTROM INSTRUMENT, Archbald, Pa.

the full-down (47 deg.) position if throttles are full-open. When throttles are more than one-third open, flaps cannot extend beyond 40 deg. This will reduce drag and keep the plane fully controllable during such maneuvers as a go-around, when throttles might be pushed to the firewall while flaps are fully extended.

• **Gear and pitot.** There is a tie-in system between the landing gear retraction and pitot systems. This prevents inadvertent gear retraction until the plane has reached an indicated airspeed of 80-85 knots. System can be bypassed at the pilot's option.

• **Water and torque.** Each engine is equipped with a power restoration system. It works this way:

If, on takeoff, the engine reaches a given certain rpm. but a torque-measuring device indicates that the engine is not developing full power for that rpm., water methanol is supplied to the engine to bring it up to power. When full power is reached, the water is shut off. System is altitude-compensated so that engines which are developing full power for a given altitude will not receive water injection simply because of power deficiencies due entirely to operation in rarefied air.

• **Other systems.** Capital says it is the first Viscount operator to have a fire detection and extinguishing system installed in the forward and aft cargo holds. It uses Fenwall detectors and CO_2 extinguishers.

Pneumatic system on the Viscount has the sole duty of inflating rubber seals used on the main entrance and rear compartment doors and two underfloor compartment doors.

Air pressure to the seals is turned on automatically when the doors are closed and is shut off when the doors are opened. In case of pressure failure, a valve can be used to apply cabin air pressure to the seals. A check valve prevents cabin air pressure from leaking out through a broken line.

Thermal de-icers are mounted on the engines' fuel filters to keep them from becoming clogged with kerosene "ice" crystals during cold weather operations.

▶ **Alexandria Warehouse** — Capital spokesmen are pleased at Vickers' decision to open a warehouse in nearby Alexandria, Va., where a large stock of Viscount spares will be stocked. The building, which Vickers will lease from Capital, will house a multi-million-dollar supply of parts, according to the airline.

CAP estimates that in almost all cases the warehouse will make it easier to procure spares for the Viscount than to get parts from the West Coast.

W. J. Young, Vickers supply superintendent, will be in charge of the warehouse operation.

RCA's NEW WEATHER RADAR

In the AVQ-10, RCA offers to pilots a much-improved system for preventing costly detours due to storms across their routes. Its ability to "see" into storms from miles away and to pick non-turbulent paths through or between them, contributes greatly to passenger comfort and operational economy.

It is the first airborne weather radar to operate in "C"-Band (5.6 cm), the ideal radar frequency for storm detection and penetration.

RCA is proud to offer the AVQ-10 as a major contribution to commercial aviation's constant effort to improve passenger comfort and arrival-time dependability.

LIGHTER — Weight has been cut to under 125 pounds for the complete system including shock mounts.

SIMPLER — Both mechanically and electronically, the cleanness of design of the AVQ-10 insures stable, trouble-free operation.

SURER — A new design with simplified circuitry, generously derated components and employing fewer tubes, rectifiers, and crystals assures a new high standard of performance and reliability.

Airline and executive operators are invited to ask for more complete information.

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UP AND AT 'EM
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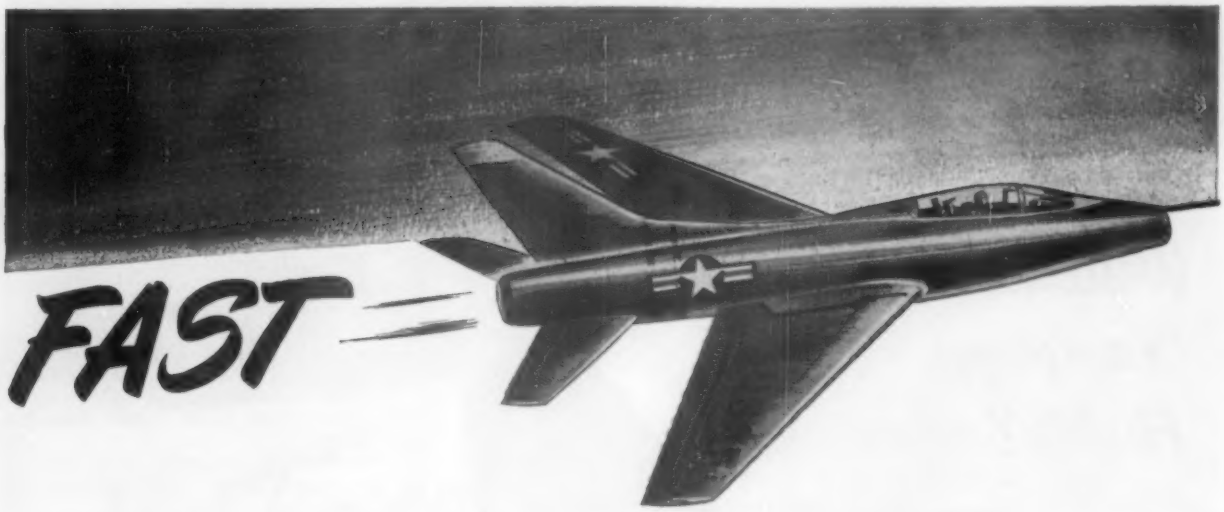
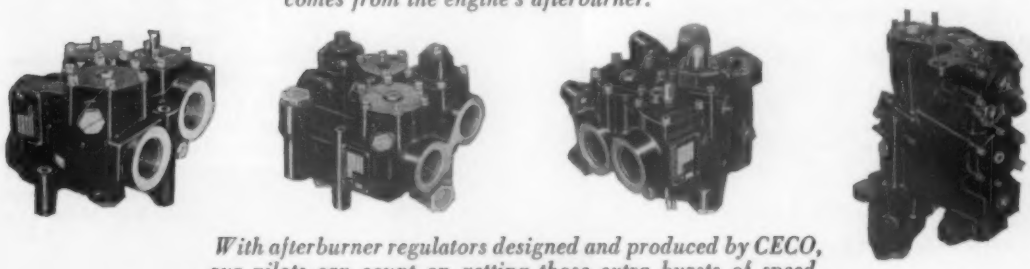


When the need arises, our jets must get up and at 'em fast . . . airborne and on the way to intercept within seconds of the first radar alert. The added power to thrust several tons of fighting craft into the air in a hurry — to supply "throttle-burst acceleration" for delivering the knock-out punch — comes from the engine's afterburner.



With afterburner regulators designed and produced by CECO, our pilots can count on getting those extra bursts of speed . . . power in a pinch . . . when needed most. And from the CECO engineering-production team you can count on jet-engine components designed and built to meet your most exacting requirements.

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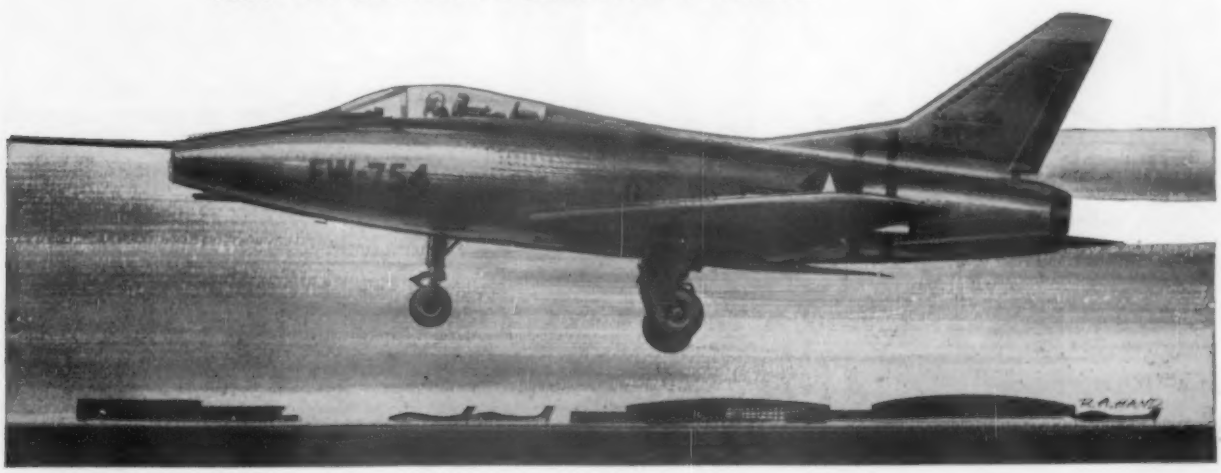

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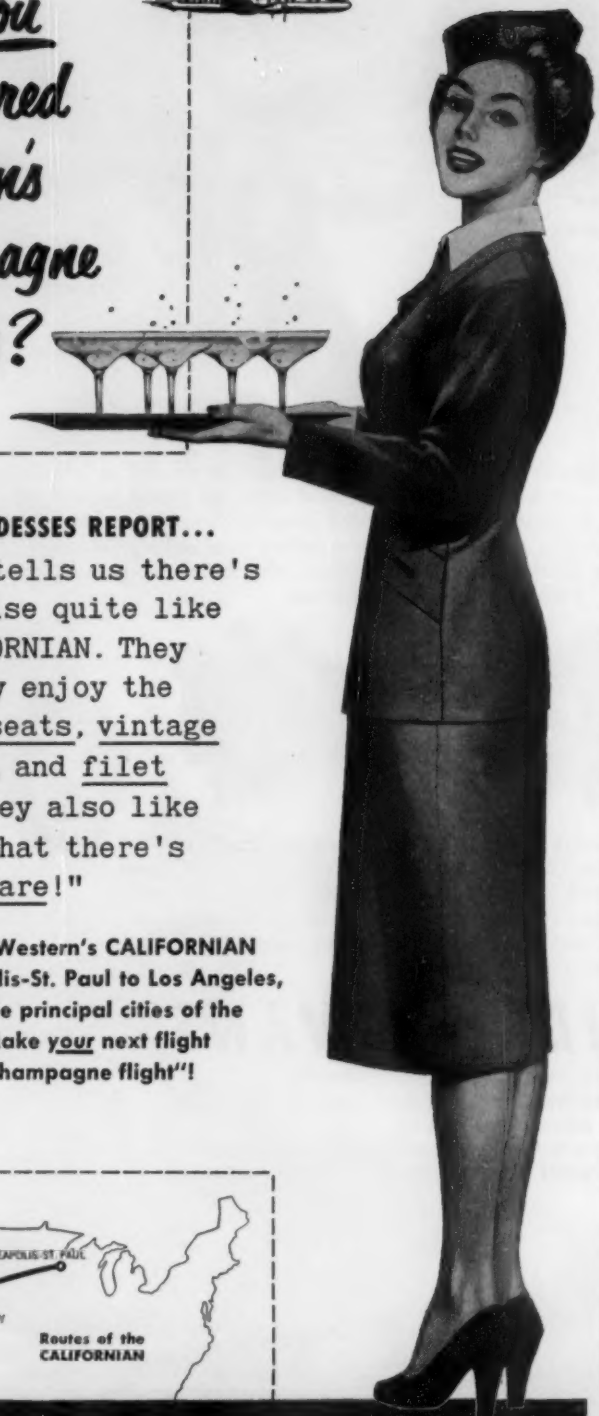

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WESTERN AIRLINES

AVIATION CALENDAR

Feb. 21-22—National Model Plane Show, Higbee Co. auditorium, Cleveland.

Feb. 22-25—International Air Transport Assn., four-day conference of airline public relations directors, Kurhaus Hotel, The Hague.

Feb. 23-25—Fourth annual Ohio-Indiana Agricultural Aviation Conference, Purdue University, Lafayette, Ind.

Feb. 24-25—National Aviation Education Council, fifth annual meeting and conference, Hotel Statler, St. Louis.

Feb. 26-27—Associated Glider Clubs of Southern California, ninth annual Pacific Coast Mid-Winter Soaring Championships, Torrey Pines Glider Port, San Diego.

Mar. 8-10—Air Line Pilots Assn., third annual safety forum, Shoreland Hotel, Chicago.

Mar. 11—Institute of the Aeronautical Sciences, National Flight Propulsion Meeting (restricted), Hotel Carter, Cleveland.

Mar. 14-16—Society of Automotive Engineers, production meeting and forum Netherland Plaza, Cincinnati.

Mar. 14-18—American Society of Tool Engineers, first Western Industrial Exposition, Shrine Auditorium and Convention Hall, Los Angeles.

Mar. 20-23—Aero Medical Assn., 26th annual meeting, Hotel Statler, Washington, D. C.

Mar. 21-24—Institute of Radio Engineers, national conference, Waldorf-Astoria Hotel, Kingsbridge Armory, New York.

Mar. 28-Apr. 1—American Society for Metals, ninth Western Metal Exposition and Congress, Pan Pacific Auditorium and Ambassador Hotel, Los Angeles.

Mar. 31-Apr. 1—Symposium on Boundary Layer effects in Aerodynamics, Britain's National Physical Laboratory, Teddington, England.

Apr. 5-7—Radio Technical Commission for Aeronautics, spring assembly and joint meeting with the Institute of Radio Engineers, Los Angeles.

Apr. 6-10—World Plastics Fair & Trade Exposition, National Guard Armory, Los Angeles.

Apr. 14-15—American Ordnance Assn., symposium of Proving Ground Instrumentation Committee, Patrick AFB, Fla.

Apr. 16-20—American Association of Airport Executives, 1955 annual convention and business meeting, El Conquistador Hotel, Tucson, Ariz.

Apr. 18-21—Society of Automotive Engineers, Golden Anniversary Aeronautic Meeting, Aeronautic Production Forum and Aircraft Engineering Display, Hotel Statler and McAlpin Hotel, New York.

Apr. 18-21—American Society of Mechanical Engineers, Diamond Jubilee spring meeting, including four aviation sessions, Lord Baltimore Hotel, Baltimore.

Apr. 20-22—American Rocket Society, spring meeting, Baltimore.

Apr. 27-29—Society for Experimental Stress Analysis, spring meeting, Hotel Statler, Los Angeles.

Apr. 27-30—American Helicopter Society, 11th annual forum, Hotel Mayflower, Washington, D. C.

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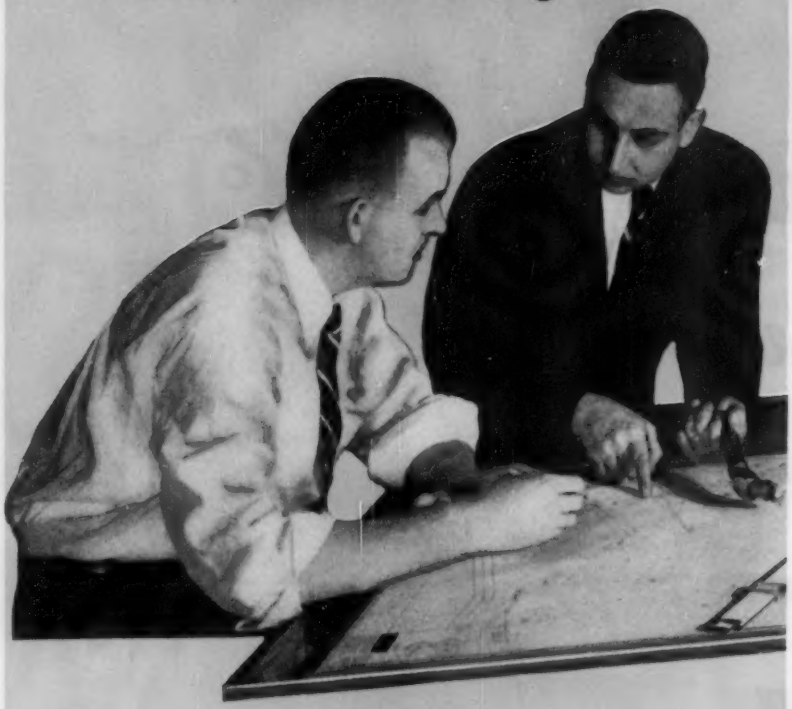

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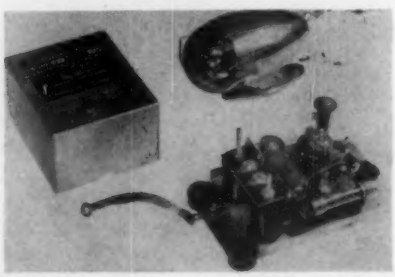
Skyhawk Oxygen Regulator Weighs Only 1¾ oz.

A miniaturized oxygen regulator is one of the weight-and-space-saving features of the new Douglas A4D Skyhawk single-seat atomic bomber. Instead of taking valuable cockpit panel space, unit is attached directly to the pilot's standard A-13 oxygen mask.

The Scott-Firewel equipment weighs only 1¾ oz., compared with the 4¾-lb. weight of a standard regulator, the manufacturer says. Additional savings are provided by a ⅜-in. breathing hose including integral microphone wires.

Variations available: Straight demand, demand with dilution, or automatic pressure breathing.

Scott Aviation Corp., 275-P Erie St., Lancaster, N. Y.



BLINK-R is going on Cessna transport.

CAA Okays Light Flasher For Private Aircraft

Private plane operators can now get a navigation light flasher that is seeing service on several thousand military liaison planes and helicopters, following approval of the device by Civil Aeronautics Administration.

The Blink-R is being installed as standard equipment on Cessna's new Model 310 light twin-engine transport, the distributor reports. Military installations include the Cessna L-19, LC-126 (Cessna 190) and de Havilland-Canada L-20 Beaver.

A fail-safe feature puts the lights into

a "steady-on" condition should the timing mechanism go out. A toggle switch can be installed so that the pilot has a choice of blinking or steady lights.

The unit has a blink-rate of 60 to 120 flashes a minute, is fully shielded and has a radio interference filter. It weighs 13 oz. and can be installed anywhere on a plane's navigation light circuit. It measures 3 x 3⅜ x 2 in., has three rubber-grommeted mounts to alleviate vibration. Operation can be on a 12-v. or 24-v. system and lamp capacity is 6 amp. Price is $28.50.

Van Dusen Aircraft Supplies, Teterboro Airport, Teterboro, N. J.

PORTABLE NIBBLER makes clean cuts.

Light-Duty Nibbler Cuts 18-Gage Stainless Steel

A lightweight portable nibbler that can cut all types of stainless steel up to 18 gage, milder steels and other sheet steels to 16 gage, works at the rate of 42 in./min. and with a minimum cutting radius of ⅛ in., the manufacturer reports.

Using a punch and die action, the tool takes out a tiny metal slug with each cutting stroke, leaving all cuts clean, without distortion, burrs or elongation on either side, it is stated. It can be used as a hand tool or vise-mounted for bench operation.

The manufacturer also is producing a special head for cutting corrugated metals and a new 90-deg. die holder for its heavy-duty nibbler for handling up to 14-gage stainless. It can work to a square corner on a 90-deg. turn without scrap loss, it is stated.

Fenway Machine Co., 263 North 23 St., Philadelphia 3, Pa.

Feedback Controls Speed of Low-Price Electronic Drive

A new line of electronic adjustable-speed drives using a tachometer feed-

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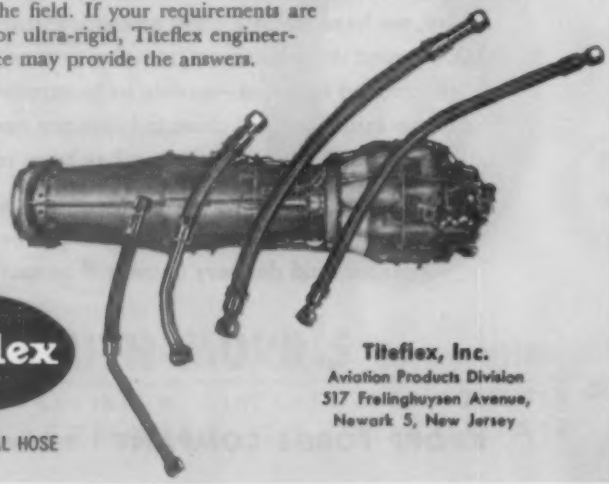
To make our products and service even better, we continually reevaluate our quality standards at home and on maintenance calls in the field. If your requirements are unusual or ultra-rigid, Titeflex engineering service may provide the answers.



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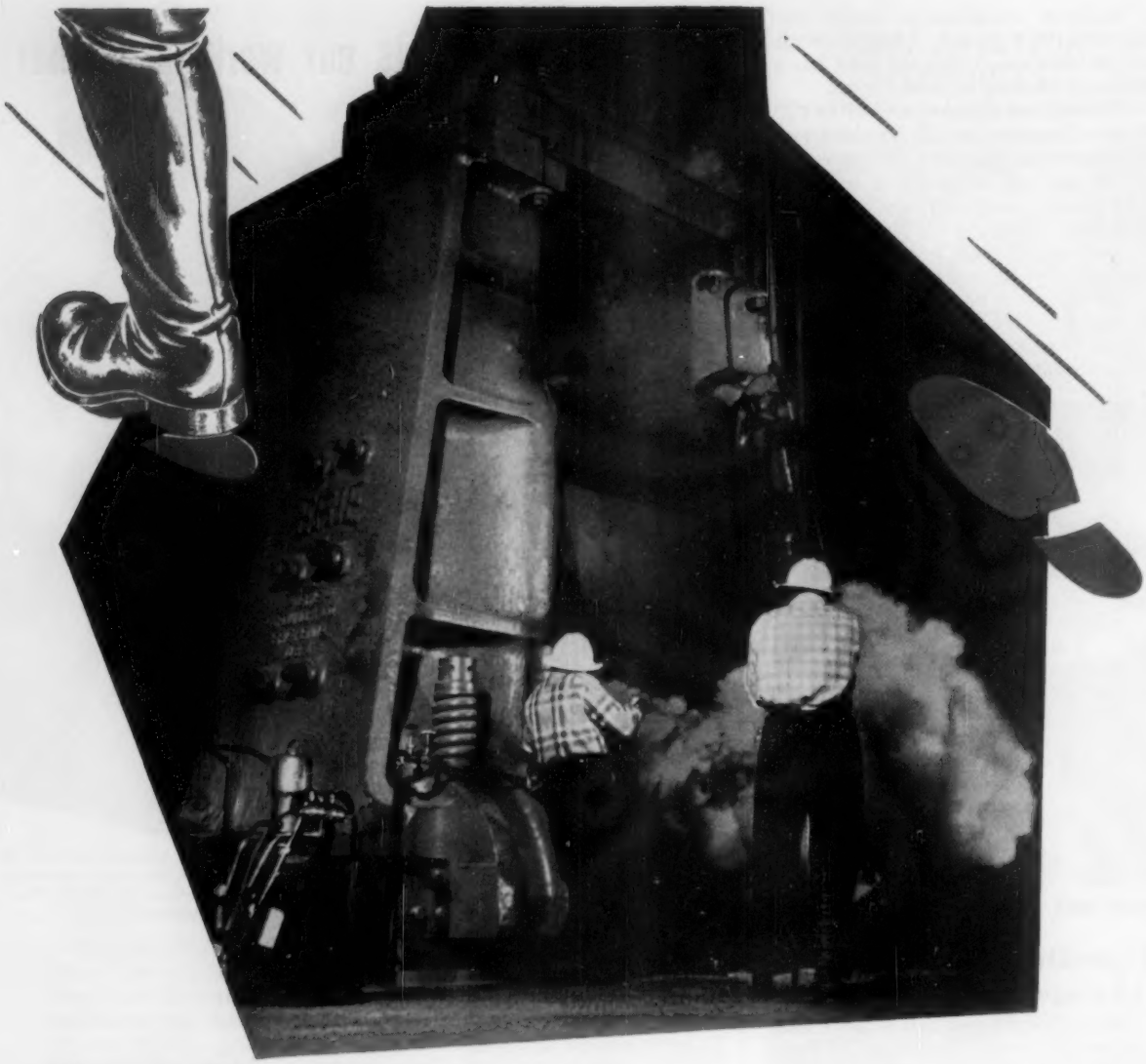

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back signal to hold speed within desired setting, sells for less than $200, complete with motor.

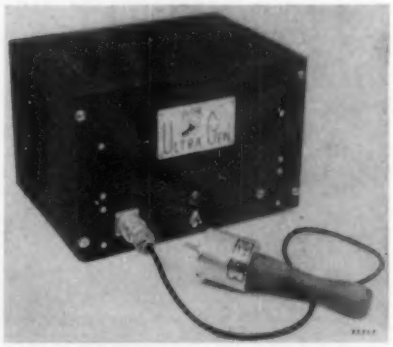
Both one-quarter and one-half models are available with choice of either 1,800 rpm. or 3,600 rpm. as base motor speed. Both motors are stated to supply constant torque over a 30:1 speed range. Only a screwdriver is necessary to replace any part, the maker says. All resistors, capacitors and the like are fully escapulated within a single plug-in assembly by means of a hard epoxy resin.

Servo-Tek Product Co., Inc., 1086 Goffle Rd., Hawthorne, N. J.

ALSO ON THE MARKET

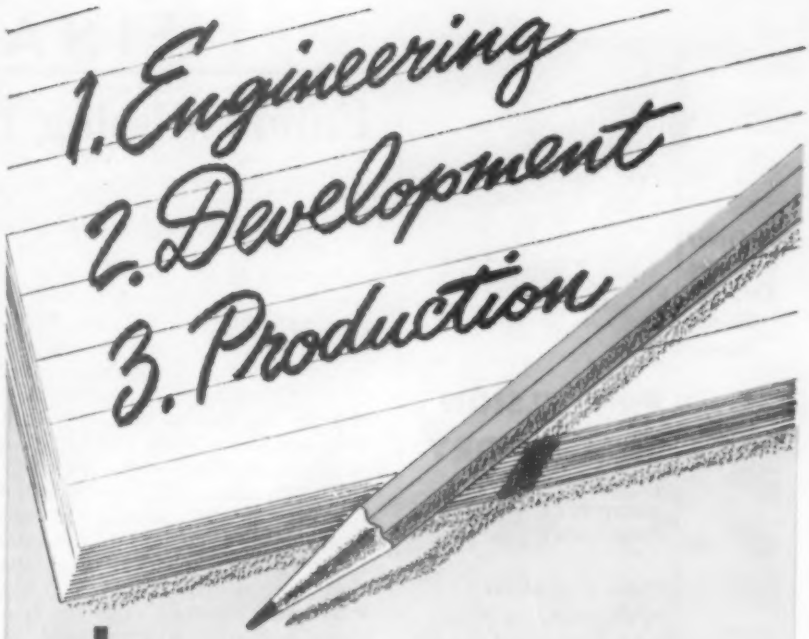
Variable delivery pumps for hydraulic systems requiring constant high pressure from zero to full flow are made in two models: Series PVM-600 with handwheel control for manual adjustment and Series PVC-600 having automatic regulation. Units generate continuous duty pressure to 5,000 psi., deliver 3 gpm. at 1,200 rpm.; at maximum continuous speed of 2,000 rpm. they deliver 4 gpm. and provide over 11 hydraulic horsepower.—Dudco Division, New York Air Brake Co., 1700 E. Nine Mile Rd., Hazel Park, Mich.

Fluxless soldering is possible using Alcar solder-gun, a magneto-strictive transducer driven by an electronic generator. The transducer cleans the surface oxides beneath the pool of molten solder and wetting is completed before



any re-oxidation occurs, the maker notes. Unit weighs 50 lb. and generator operates from 60-cycle 115-v. source. Bench space: 10x14 in.—Alcar Instruments, 20-21 Wagaraw Rd., Fair Lawn, N. J.

Redesigned circuit going into all Metron single-and-triple-range tachometers is stated to increase life of these units about five times. Linear circuit permits use of single-and-multiple-range indicators calibrated in any units per time.—Metron Instrument Co., 432 Lincoln St., Denver 3.



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FINANCIAL

Funds Missing Bet in Aviation?

Investment trusts generally have steered clear of airline and aircraft stocks, lost chance to ride rising market.

Aviation shares have not won any popularity contests with general-type investment trusts. This is despite their substantial rise in the market place in recent years. A preliminary review of 1954 trust fund investments makes notable the general absence of aviation equities. There are exceptions, of course, but these are few in number.

Perhaps these funds do not quite comprehend the present investment characteristics inherent in the group. Perhaps, having been hurt in the past, they are now gun-shy.

▶**National Aviation Corp.**—The largest specialized aviation trust fund, National Aviation Corp., has demonstrated a highly successful management record. For this reason, its 1954 portfolio shifts are of particular interest.

Airline stocks had increased appeal for this fund; however, aircraft stocks continued to predominate, despite net liquidations of almost $3.7 million last year. The aircraft category at the 1954 year-end represented 61.7% of the total market value of National's investment portfolio, compared with 63.3% a year earlier. Airline commitments increased to 34.4% from 24.3%. This gain in the airline investment was accomplished by reducing cash and related items to 3.9% at the 1954 year-end from 12.4% a year earlier.

National posted the best results in its history by winding up 1954 with net assests of $17.3 million, or $38.51 per share on the 477,274.6 shares outstanding. This was after disbursing $6.15 per share in dividends.

Significantly, depending on the point in National's range of 20¾ to 47½ in which an investor purchased the fund's stock last year, the dividend yield would have been anywhere from 33.6% to 13%. And, $4.94 of the dividend is to be treated as long-term capital gains.

Total 1954 earnings came to $2,670,427, or $5.98 per share. Of this, $2,139,360, or $4.79 per share, was derived from realized profits on the sale of securities. This compares with 1953 net earnings of $1,372,509, or $3.07 per share. In 1953 total dividends aggregated $2.50 per share.

▶**The Year's Changes**—At the 1954 year-end, National Aviation's aircraft portfolio, with a cost of more than $3.1 million, enjoyed a market valuation of better than $10.6 million. Airline commitments at the same date had a market value of almost $6 million, against a cost of around $4 million.

The only new airline investment last year was in 10,000 shares of Capital Airlines. Other major increases were 24,000 American Airlines (common), 8,600 Eastern, and 20,000 United Air Lines (common) and 1,000 preferred. Not a single airline investment was liquidated by National last year.

On the other hand, a considerable number of shifts in the aircraft group was accomplished. Numerous stock dividends importantly influenced tabulations on both sides of the ledger.

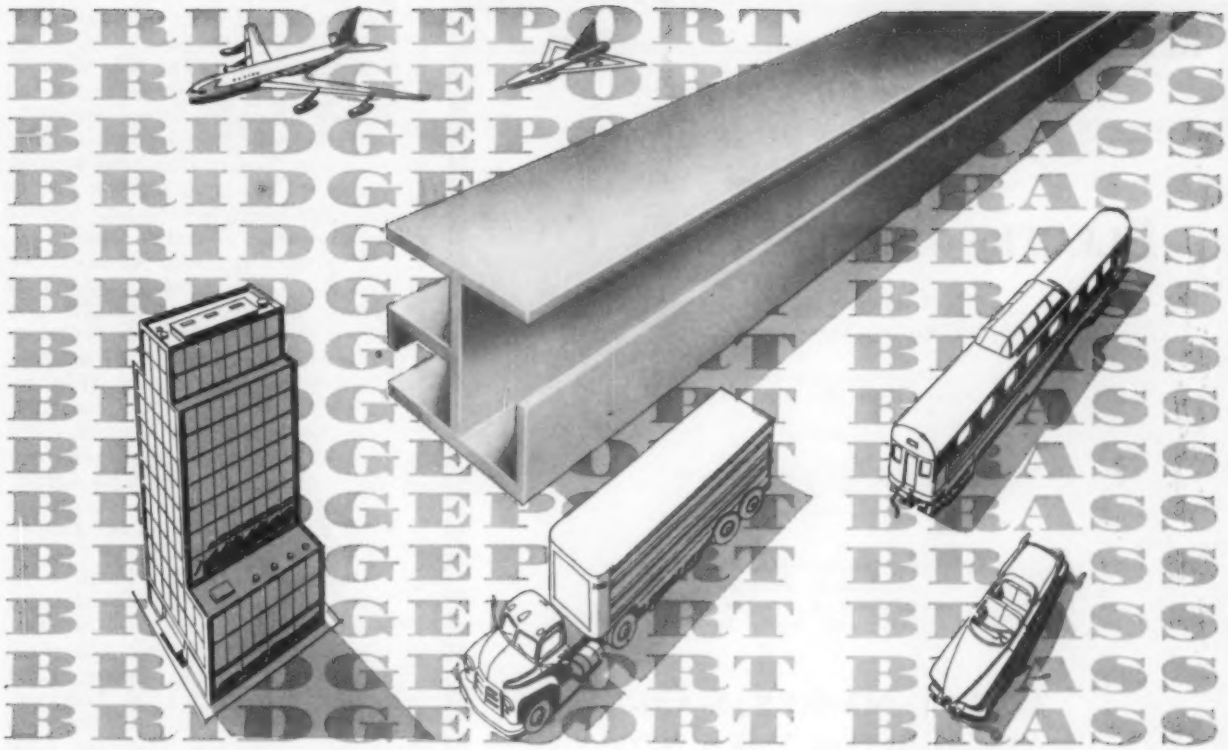
Important aircraft acquisitions last year included 15,000 Cessna and 4,000 Collins (including 2,025 from stock dividend). Slight decreases were effected in Boeing, Douglas, and Thompson Products, despite apparent increases as a result of stock dividends. In addition, relatively heavier liquidation was accomplished in holdings of Bell, Bendix, Garrett, Lockheed, North American Aviation, Republic, and United Aircraft. Also, the 5,500 shares of Chance Vought received as a "spin-off" from United Aircraft were sold.

• **Aircraft portfolio.** Reflecting all changes during 1954, National Aviation's aircraft portfolio at the year-end comprised the following: Bell, 18,000; Bendix, 3,500; Boeing, 20,000; Cessna, 15,000; Collins, 14,000; Curtiss-Wright "A," 10,000; Douglas, 15,000; Garrett, 6,000; G. M. Giannini, 4,000; Greer debentures, 75M; Lockheed, 9,450; Glenn L. Martin, 11,000; North American, 27,500; Republic, 9,900; Thompson Products, 14,000; United Aircraft, 15,000.

• **Airline portfolio.** In the airline group at the same date, investments consisted of the following: American common, 60,000; American preferred, 8,200; Capital, 10,500; Delta debentures, 430M; Eastern, 27,500; Helicopter Air Service "A," 10,000; Mid-Continent Airlines debentures, 345M; New York Airways, 5,000; United Air Lines common, 30,000; United Air Lines preferred, 3,300.

In the aircraft group the largest dollar investments at the 1954 year-end were in Douglas ($1.95 million), North American ($1.4 million), and United Aircraft ($1.5 million, common and preferred). Among the airlines, it was Eastern ($1 million).

National Aviation's successful and



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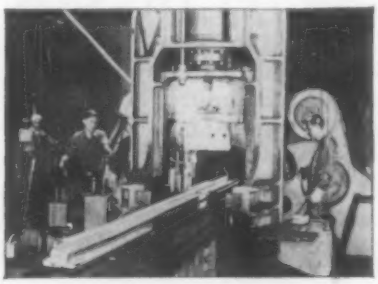

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discerning selectivity is accentuated by the departure of other specialized aviation funds from the field.

▶**Group Securities**—The only other remaining specialized aviation trust is the Aviation Fund of Group Securities, Inc. This fund has met with indifferent results, despite a booming aviation market. The reason may be due to its seeking refuge in wide diversification and heavy sales of aircraft shares.

Total assets of Group Securities' Aviation Fund aggregated $2,142,844 as of Nov. 30, 1954, up from the $1.6 million a year earlier. Net security profits amounted to $199,534 last year. Major transactions during 1954 included the sale of 3,900 Lockheed, 5,200 North American Aviation, 2,000 General Dynamics, 2,300 United Aircraft, 600 Bendix, and 1,700 Braniff.

Acquisitions consisted mainly of 2,000 PanAm, 2,500 National Airlines, 1,000 Curtiss-Wright "A."

Holdings of Aviation Fund, as of Nov. 30, consisted of 11,000 American Airlines, 400 Bendix, 700 Chance-Vought, 4,000 Curtiss-Wright "A," 2,100 Douglas, 4,500 Eastern, 1,500 General Dynamics, 3,600 Lockheed, 6,000 National, 3,800 North American Aviation, 7,000 Pan American, 2,000 Sperry, 2,200 United Aircraft, and 5,500 United Air Lines.

▶**Massachusetts Investors**—Massachusetts Investors Trust, the country's largest general-type investment trust, with net assets of more than $791 million, on balance continued to add to its aircraft commitments. Last year new purchases included 55,000 United Aircraft, 25,000 North American, and 10,000 Douglas. The Chance Vought shares received from United Aircraft were sold, along with 20,000 Grumman.

At the 1954 year-end, its aviation holdings were concentrated in 70,000 Douglas, 150,000 North American Aviation, and 135,000 United Aircraft.

Interestingly enough, MIT's three aircraft investments were valued at $27.4 million at the 1954 year-end (compared to $9.3 million a year earlier) and exceeded by a wide margin the total assets of National Aviation Corp., the largest specialized aviation fund.

▶**Missed the Boat?**—As a group, general-type investment funds showed relatively little interest in aviation shares.

A number of the country's major trusts have persistently refrained from buying any aviation shares in recent years. In retrospect, this reveals a significant lack of understanding by professional money-managers.

Equally significant, it discloses that the aviation industry—particularly the airlines, who may have future need for substantial capital—have no easy entrance into the multi-billion reservoir funds controlled by these general investment trust funds. —Selig Altschul

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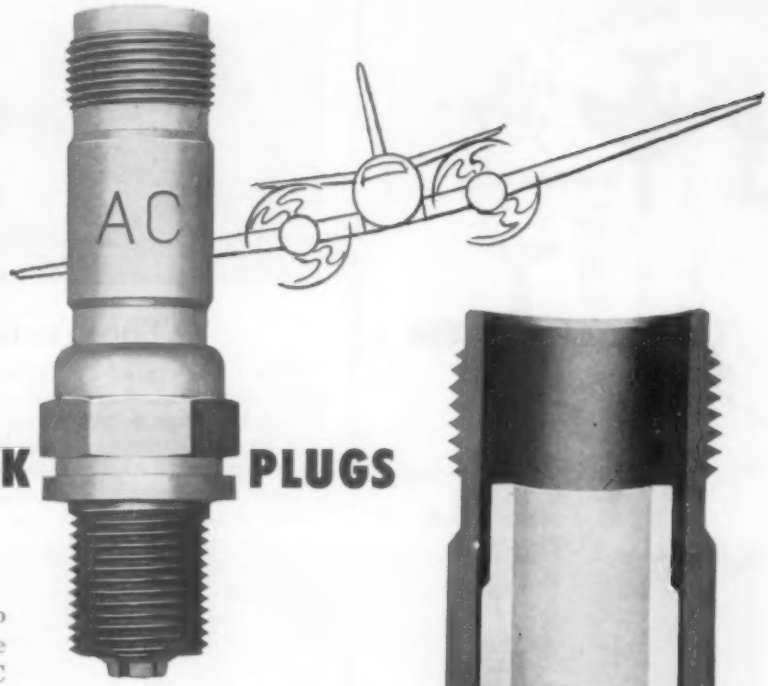

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Proved in use by Commercial Airlines

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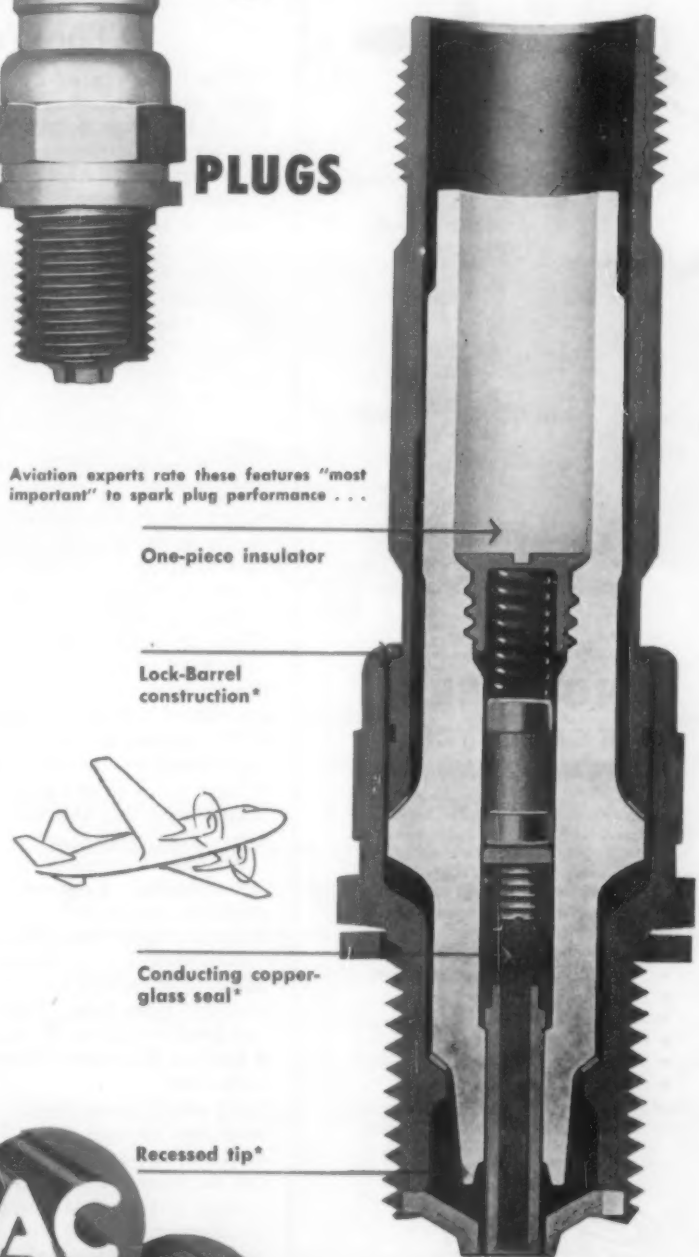
Aviation experts rate these features "most important" to spark plug performance . . .
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The Turbulent Terminal

If air traffic control can rightly be called one of aviation's biggest headaches, and it can, then the terminal area dilemma is surely in line for the title of The Magnificent Migraine. The vast speed differentials of today's air vehicles require that any system handle velocities from zero up—way up—and do it safely. And in a crowded terminal area, this can get interesting.

Numerous groups have taken a whack at solving some of these problems, mainly in laboratory studies, and various notions have arisen from this work. One idea that consistently crops up is that it is possible to mix everything from jets to helicopters in one traffic pattern and not only maintain an orderly and safe flow of traffic but also achieve very close spacing.

▶ **Two Conclusions**—One recent evaluation—using a dynamic simulator—went on at great length for some 67 pages of graphs and formulae, covering many hours of work and thousands of taxpayers' dollars in an effort to shed light on the subject before coming to two main conclusions:

1. That highspeed turnoffs are needed on the instrument landing runway and,

2. More work should be done in order to evaluate the problem fully. (This last, incidentally, is standard fare in such work. Possibly because it means more thousands of dollars.)

The theory that all kinds of aircraft can be mixed safely around one airport never has made much headway among pilots. This may possibly be due to the fact that too many of us have been badly scared when we came busting up behind a helicopter (and pity the poor copter pilot), or try to follow or dodge a jet.

In most of these cases it is difficult to know who's kidding who. Seems like an hour or so spent at the local airport merely looking around would gain just as much and certainly would be cheaper.

▶ **B-47 Backwash**—On the practical side of the evaluation ledger was a recent experiment by one of CAA's airways flight inspection pilots who tried following a B-47 at various distances. Briefly he found that at one mile his Twin-Beech was violently uncontrollable; at two miles uncontrollable; at three miles violent, and at four miles barely possible.

Similar experiments have been tried by others, with substantially the same results. Apparently this turbulence factor didn't show up in the simulator, but it had better not be ignored lest large numbers of passengers start turning in the unused portion of their roundtrip tickets.

Incidentally, it is often wondered around the industry why more use isn't made of these CAA airways inspection pilots and the information readily obtained from them. These pilots must be half engineer, half radio wizard and good enough to fly every mile of federal airways with extreme accuracy.

▶ **Built-in Knowhow**—Their operation should be the industry's practical workshop.

Of course, since these CAA pilots do not receive enough money for the work they are now doing (I daresay not nearly as much as a three-year airline co-pilot), the ante will need increasing. But on the other hand, where else can so many get so much for so little?

This vast fund of operational knowhow could produce answers to many questions connected with traffic control, instrument flying, airport lighting and goodness knows what else. We certainly keep enough ground laboratories in business; why not make use of this built-in flying laboratory as a means of getting information on many of our long-debated issues?

(Editor's Note: Aviation Week gives Capt. Robson an opportunity to express himself freely in this column. Comments from readers on his opinions are welcome.)

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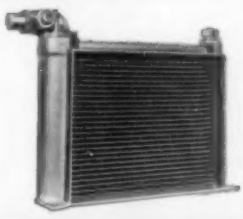

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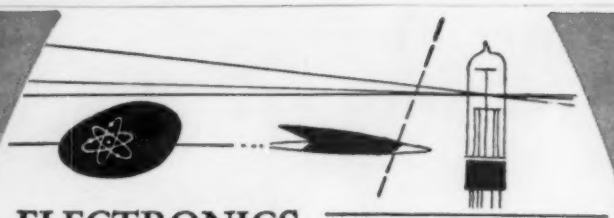

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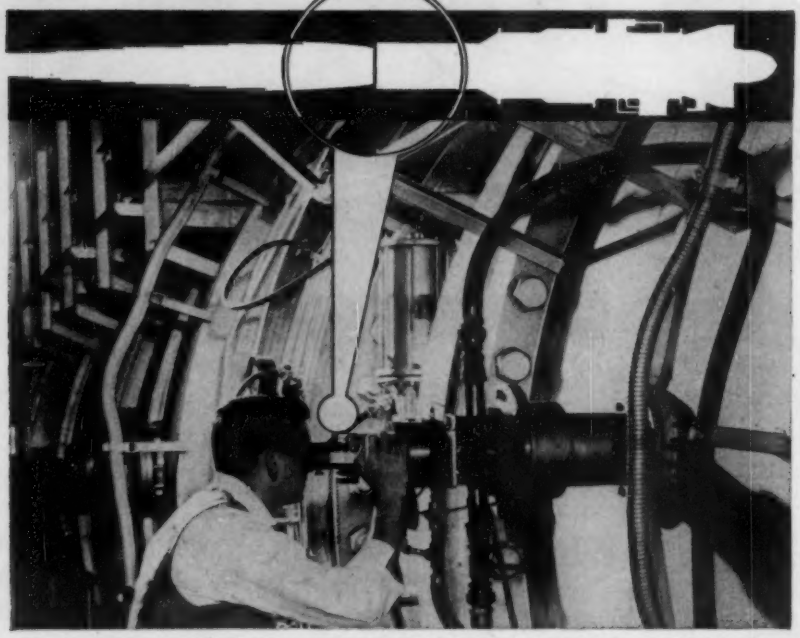

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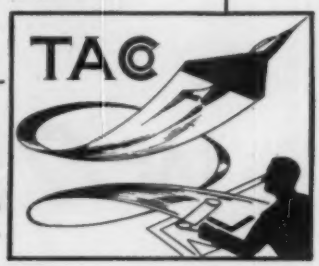

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AIR TRANSPORT

Examiner Wants Nonsked Group Grounded

- **Board official says North American combine violates Civil Aeronautics Act and CAB economic regulations.**
- **Report charges the four-airline operation deliberately posed as a single carrier offering scheduled service.**

By Craig Lewis

Elimination of the North American combine from commercial air transport operations was recommended last week by Civil Aeronautics Board examiner William F. Cusick.

The examiner found the combination of nonskeds to be in violation of the Civil Aeronautics Act and the CAB economic regulations.

In dealing with the compliance case, known as the Twentieth Century compliance proceeding, examiner Cusick found:

- Stanley D. Weiss, James Fischgrund, Jack B. Lewin and R. R. Hart, individually and as partners, and North American Aircoach System, Inc., have violated the Civil Aeronautics Act.
- Twentieth Century Air Lines (now called North American Airlines), Trans National Airlines, Trans American Airways and Jacob Adelman, doing business as Hemisphere Air Transport, have violated the Act and the economic regulations.
- All violations were knowing and willful.
- Letters of registration of Twentieth Century, Trans National, Trans American and Hemisphere should be revoked and the carriers should be ordered to cease and desist from engaging in air transportation.
- Weiss, Fischgrund, Lewin and Hart, individually and as partners, and North American Aircoach System should be ordered to cease and desist from violation of the Act.

▶ **Legal Maneuvering**—North American attorneys have been attempting to keep Cusick from issuing his report until a finding is made in the New York-Chicago case. The nonskeds asked the U. S. Court of Appeals to instruct CAB to proceed with the New York-Chicago case before the compliance case, but the court turned them down, and the Board released the report.

The case started in March 1953 on a complaint filed by the office of compliance of CAB. After extensive legal maneuvering in CAB and in various courts, hearings finally were concluded last July and briefs filed last fall. Now the examiner has filed his reports and the parties involved will file exceptions. Final decision will come from the Board.

The proceeding is concerned with the corporate labyrinth constructed by the four individuals who form the core of the North American operation. Weiss, Fischgrund, Hart and Lewin were found by Cusick to control the whole operation either directly or indirectly.

▶ **'Purposely Designed'**—In the matter of illegal combination of operations, the examiner said, "It is abundantly clear that respondents, Twentieth Century Air Lines, Trans National, Trans American and Hemisphere have conducted combined operations so as to render a frequent and regular service not permissible under the limited authority granted in . . . the economic regulations."

The report also found: "There can be no doubt but that these activities on the part of the respondents are purposely designed to impress the general public that 'North American Airlines' is a single entity conducting regularly and scheduled air transportation service.

"Even the respondents Weiss and Lewin, when confronted with various pieces of advertising used by the North American combine," the examiner stated, "were sometimes at a loss to identify the company in the group referred to in the advertising. None of the wide variety and extensive advertising paid for by the respondents carries any information which would notify the public that the services offered are of an irregular nature or that any carrier other than 'North American Airlines' provides the services."

Ticketing practices used by the North American operation were found to be in violation of CAB's economic regulations.

▶ **Carrier's Argument**—Substantial part of the North American group's defense was concentrated on questioning the validity of the sections of the act and the economic regulations applied in the case. Cusick reviewed them thoroughly and concluded that they were both valid and applicable.

'Radical Penalty'

The examiner's recommendations are described as "a radical and reckless penalty to propose" by North American Airlines president J. B. Lewin. He says it reminds him of "the Queen in 'Alice in Wonderland' who went around screeching: 'Off with their heads' as punishment for minor offenses.

"The real issue in this case is whether the regulations of which violations are charged are lawful," says Lewin. "We believe they are not.

"The only important question is the lawfulness of the Board's regulations and this will, of course, have to be decided in court. North American will leave no stone unturned in seeking judicial action to set aside these regulations."

The North American combine pointed out that it was an applicant for certification in four route cases—New York-Chicago, Denver service, Southwest-Northeast service and New York-Florida—and that revocation of authority would eliminate them from air transportation.

Cusick observed: "It certainly appears that respondents took a calculated risk when they devised their plan to conduct air transportation operations in violation of the Act and regulations. In any event, if credence is to be given to this argument, regulation of the air transport industry as envisioned by the Congress . . . would abruptly cease to exist.

"Any party could, under such circumstances, set up an air transportation service, in wanton disregard of the Act and regulations, and, by the simple expedient of filing an application for a certificate of public convenience and necessity, the illegal operation could proceed completely unmolested. The absurdity of such a situation is immediately apparent."

▶ **Revoke Registration**—The report concluded: "On the face of the record . . . it cannot be found that respondents were particularly concerned with the public interest but, on the contrary, were more interested in private gain.

"This was to be achieved by a very devious plan of operations clearly calculated to evade and circumvent, if possible, the express provisions of the Act and the regulations thereunder, or,

if need be, to disregard the Act and the regulations adopted pursuant thereto.

"In view of the willfulness of the violations committed by the respondents . . . it is found that the only adequate remedy available to the Board in order to compel compliance by respondents with the provisions of the Act and the regulations is to revoke the letters of registration of Twentieth Century Air Lines, Inc. (North American Airlines, Inc.), Trans National, Trans American and Hemisphere, and to order said carriers to cease and desist from engaging in air transportation," said Cusick.

The examiner also found that Weiss, Fischgrund, Lewin and Hart, individually and as partners in Republic Aircoach System, Twentieth Century Aircraft Co., California Aircraft Co. and Standard Airmotive Co., and North American Aircoach System all should be ordered to stop violating the Civil Aeronautics Act.

▶**The Structure**—North American Airlines is a network of operating and nonoperating companies instead of a single airline. Under the authority to operate given these companies by CAB, they must offer irregular services and not engage in any kind of regularly scheduled operation.

It takes a number of companies and authorities to offer the volume of service North American operates. Evidence in the case showed the nonsked had a daily service between New York and Los Angeles which was rendered on all but 37 days in 1952 and all but 19 days in 1953.

The four operating companies involved are Twentieth Century, which has since changed its name to North American, Trans American, Trans National and Hemisphere. Since the case began, a fifth company, Unit Export has been added. These are the five holders of letters of registration under which the group actually flies.

▶**Partners in Combination**—The Republic Aircoach System does the accounting and handles the money for the group.

North American Aircoach System handled promotion, advertising, sales and ticketing for the four operating nonskeds.

Twentieth Century Aircraft Co. owns aircraft and leases them to the carriers, as did California Aircraft Co. and Standard Airmotive Co.

Weiss, Lewin, Fischgrund and Hart were partners in various combinations in Republic Aircoach System, Twentieth Century Aircraft Co., California Aircraft Co. and Standard Airmotive Co.

▶**Dummy Officers?**—The complaint against the various individuals and companies was that they were operating in violation of sections of the Civil Aeronautics Act that require a carrier to be certificated, prohibit airlines to combine or acquire control over other carriers, and govern irregular operations including regulation of ticketing practices.

A key question involved was whether the four individuals involved in the case actually controlled the companies in which they were not officers—whether the officers were actually dummies set up as puppets of Weiss, Hart, Fischgrund and Lewin.

Cusick found that the four carriers—Twentieth Century, Trans American, Trans National and Hemisphere—were controlled by the four individuals.

▶**'Figureheads'**—"Even had it not been previously found that the alleged owners of the stock in Twentieth Century Air Lines, Trans National, and Trans American were merely straw men set up to conceal the identification of the true owners, and if the reverse had been true, the evidence is substantial in showing that the beneficial ownership and control is lodged in the respondents Weiss, Fischgrund, Lewin and Hart. The same is applicable to Hemisphere," he said.

In reference to testimony received from employes and officers of the companies who testified in the case, Cusick said: "Certain of these witnesses, although designated as officers of the air carrier respondents, were obviously ignorant of the affairs of their company, and it is clear from the record that they are mere figurehead officers."

Dual Insignia on DC-6B

Insignia of both Continental Air Lines and United Air Lines adorn this CAL Douglas DC-6B placed in service on Seattle-Denver-Tulsa routes operated jointly under an interchange agreement. Continental's two other DC-6 transports, operated under an interchange with American Airlines to Houston, San Antonio, El Paso and West Coast cities, also will carry dual identification.

JAL Future

- **Japan's flag airline to try for big gains in 2nd year.**
- **But carrier needs more subsidies for operation.**

Japan Air Lines, having taken a big bite of passenger traffic away from other carriers in its first full year of trans-Pacific operation, is expanding its services to try for even bigger gains this year.

In an extension of its Okinawa service, JAL is introducing twice-weekly flights between Tokyo and Hong Kong. In addition, the airline plans to increase its present $6-million capitalization by more than a third.

In the near future, the Japanese carrier expects further expansion of services to southeast Asia and extension of eastward service to Brazil. A survey flight of the proposed route from San Francisco to Sao Paulo was made last October and a second exploratory flight is scheduled for Mar. 10.

▶**'Healthy' Traffic**—With no program for new equipment before 1957, JAL plans to handle all new services with its present five Douglas DC-6Bs, a fleet that thus far has been able to run up some impressive traffic marks.

With per plane loads on the San Francisco-Tokyo run averaging close behind first-place Pan American World Airways, traffic on JAL's thrice-weekly flights has been "most healthy," according to the company's San Francisco vice president Yoshito Kojima.

Average for the 11 months ended Dec. 31 was 27.9 passengers per plane and 29.6 for the last half of 1954, compared with PAA's 12-month mark of 31.4 on the Tokyo-Honolulu run.

▶**Aircoach Ratio**—Loads cannot be accurately figured, since JAL runs combination-class service and maximum loads vary with the changing demands for aircoach and first-class service. Maximum seating, all first-class, is 38; all tourist is 58.

Heavy demand for coach has resulted in a sales ratio of 2-1 over first class.

So far, most traffic is commercial. But JAL officials now are promoting pleasure travel, especially for Japan's cherry blossom season Mar. 15 to Apr. 15. Flights for this period are booked solid, and the airline hopes this will be the beginning of a steady influx of tourist traffic.

▶**Financial Problems**—JAL's biggest problem to date is financial—caused by growing pains plus a still lukewarm attitude toward civil aviation on the part of the Japanese government.

Kojima believes, however, that the

government finally has realized substantial subsidies are imperative for the successful operation of a Japanese international airline He says the extent and type of subsidy is under study by a civil aviation policy deliberation council attached to the Premier's office.

The JAL official points out that the pre-war Japanese domestic airline received a 50% operation subsidy.

Present financial burdens under which JAL is laboring include:

- It must pay Japanese security market rates of about 12% interest on short-term loans.
- It paid premium prices for its DC-6Bs, hurrying delivery by taking over orders of other airlines.
- It is over-crewed because of the need for training Japanese pilots to replace present American crews (U. S. crews are slated to remain for about three more years).
- It must farm out its overhaul work (to United Air Lines), while training maintenance personnel.

JAL received a $3-million subsidy from the government last year, expects to get that much again in 1955 and hopes for $2.5 additional subsidies. It also has a plea in for a 10% fare jump and exemption from the 20% transportation tax in its domestic operation.

The carrier's gross revenues in 1954 totaled $8 million, $5 million from trans-Pacific operations.

Decisions in Pacific Cases Become Final

After a two-week delay, the decisions in the trans-Pacific and West Coast-Hawaii cases have been made final by the President and Civil Aeronautics Board.

The final orders incorporate the changes asked for by President Eisenhower, including his late modification of the Seattle/Portland-Hawaii route (Aviation Week Feb. 14, p. 12).

In issuing the orders, CAB revealed its original recommendations to the President and the extent of changes made by him.

The Board recommended that:

- Northwest Airlines' Great Circle route to the Orient be certificated permanently. Eisenhower changed this to a seven-year temporary extension.
- Pan American World Airways application for the Great Circle route be denied. The President decided to put off a final decision on this.
- Northwest be certificated permanently and alone on the Pacific Northwest-Hawaii route. Eisenhower first changed this to a five-year authorization for Pan American alone, then modified his decision to include both carriers for three years.

Louis S. Rothschild

Rothschild Nominated To Succeed Murray

Louis S. Rothschild, 54, has been nominated Undersecretary of Commerce for Transportation, succeeding Robert B. Murray, Jr., who resigned Jan. 20. He is also expected to become chairman of the Air Coordinating Committee after Senate confirmation which appears to be routine.

For the last 18 months Rothschild has occupied the dual role of Maritime Board chairman and head of the Maritime Administration in the Commerce Department.

In his new post as Undersecretary, Rothschild's responsibilities are expanded to include Administration policy direction of maritime as well as surface transportation and aviation.

Rothschild first entered federal government service with the Eisenhower Administration in March, 1953, as chairman of the board of the Inland Waterways Corporation, which was liquidated under his direction. His term of office with the Maritime Board was scheduled to expire June 30, 1956.

Rothschild is a Navy veteran of World War I and a graduate of Yale University in 1920. He is president of Rothschild & Sons, a family retail business which now operates a group of stores in Missouri, Kansas and Oklahoma.

Air Traffic Survey

U. S. commercial air traffic continues to originate in the same large 22 cities (half-million population or more) year after year and 1954 was no exception, according to the latest CAA survey.

These 22 metropolitan areas produced 65.3% of the passengers, 73.5% of the mail and 78.1% of the freight carried by domestic airlines last year.

CAB Lists Causes In Three Accidents

Reports on three airline accidents in the past nine months which involved non-fatal crash-landings by two scheduled lines and a large irregular air carrier were made by Civil Aeronautics Board.

- **National Airlines:** A Lockheed Lodestar crash-landed at Miami International Airport, Nov. 12, 1954, without injury or fatality to 11 passengers and three crew members. There was no fire but the aircraft was substantially damaged. Probable cause was attributed to sudden rain shower and loss of visibility resulting in a hard nose-low landing which collapsed the landing gear.
- **Trans World Airlines:** A Martin 4-0-4 landed at Baer Field, Fort Wayne, Ind., Sept. 13, 1954, with the main landing gear partially retracted. There was no fire, aircraft damage was slight, and no injuries were suffered by the 33 passengers and crew. Probable cause was cited as an accidental retraction of the landing gear during the landing-roll before the safety system became effective.
- **Great Lakes Airlines:** An Air Force-leased Douglas C-54 made an emergency landing off the runway at Gage Oklahoma Airport on June 15, 1954, due to an intense fire in the Number 3 engine which dropped off in flight. There were no injuries to passengers or crew but the aircraft was totally destroyed by fire. Probable cause was blamed on a bearing failure of the Number 3 engine generator resulting in extreme frictional heat and fire.

Board Splits on Feeder Plan to Improve Route

Split in Civil Aeronautics Board over a North Central Airlines route has produced some new viewpoints on federal regulation of local service carriers from the two Democratic members.

The issue is an application filed by North Central to serve Duluth, Minn., from Chicago via Milwaukee and Green Bay, Wisc., to improve its Duluth-Chicago service.

▶ **Decision Deferred**—The four-man board split 2-2, and the application failed for want of a majority. Members Chan Gurney and Harmar Denny said the matter should be deferred for consideration with the North Central renewal case. The carrier's certificate expires Sept. 29, 1955.

Members Josh Lee and Joseph P. Adams took the opposite view. They would permit the proposed service to go into effect. Lee pointed out that the time element has become vitally important in dealing with feeder route patterns, and he saw no reason

why local carriers should have to wait for lengthy certificate renewal cases to make adjustments in existing systems.

"No matter how efficient the management might be," said Lee, "if a carrier does not have logical terminals, integrated routes, and a sound route pattern, it is impossible to produce the maximum traffic at a minimum cost.

"I believe the Board should single out the route pattern improvement proposals of all of the feeder carriers, one after another, and expedite them until each local service carrier has the most economical feeder route pattern which can possibly be devised within its territory," he says.

▶ **Adequate Frequency**—Adams said he considers this case "but one example of a situation which will arise with increasing regularity as more and larger post-war equipment is acquired by the trunklines and as they are forced with such larger equipment to reduce frequency of service at their smaller points.

"This inevitable tendency on the part of the trunklines, if handled in the best interests of the public by the Civil Aeronautics Board, will redound to the benefit of our local service carriers since it will increase load factors and their revenues per mile; but even more important, it will mean that air service of adequate frequency will be maintained in the best interests of the smaller communities . . ." Adams said.

Employes Take Over Lake Central Airlines

Lake Central Airlines this month became the first employe-owned scheduled airline in the history of the air transport industry. Details of the plan were first reported in AVIATION WEEK Dec. 16, 1954, p. 108.

A group of 162 employes bought 80,954 shares of common stock which represent 97½% of the local service air carrier's outstanding stock. The transaction was approved by Civil Aeronautics Board subject to recognition of the prior rights of North Central Airlines under a proposed acquisition of LCA ordered by CAB.

▶ **Payment Plan**—The 162 stockholding employes represent 65% of Lake Central's total employment with the average number of shares purchased at 500 each. The group bought 25% of the stock outright and 75% is being financed on a 24-month payment plan.

Negotiations for the stock, purchased from the Wessner family, were handled by Lloyd W. Hartman, LCA executive vice president, and Robert W. Clifford, operations vice president.

Hartman and Clifford announced the immediate initiation of a refinancing program for the five-state local carrier.

MONRONEY: Certify local airlines.

Senate Group Reviving Local Airline Hearings

Senate Commerce Committee's aviation subcommittee, under the chairmanship of Sen. Mike Monroney, will direct its attention first to local service airlines, later to the airport program, airfreight carriers and "new entry" into air transportation.

Monroney, who considers himself "new" to aviation, was critical at committee hearings last year on Air Coordinating Committee's report on air transport policy. He considered it a guidepost to elimination of competition in international air transport, to transfer of local service routes to trunk carriers and to ban nonscheduled operations.

He gave AVIATION WEEK this outlook on matters his subcommittee will consider this session:

• **Local service airlines.** Strongly in favor of permanent certification of local airlines, Monroney has set hearings to start this week as the first order of business. He anticipated legislation will be quickly approved.

Monroney also predicted that this year the Senate Commerce Committee will not attach an amendment directing the permanent certification of all-freight carriers, as well as local service lines. It was such an amendment last year that aroused the opposition of trunk airlines and was responsible, in large measure, for the failure of legislation for permanent certification of feeder airlines to pass the Senate. "We do not want to complicate this issue this year," Monroney said.

In addition to permanent certification, Monroney favors legislation authorizing federal aid to develop a replacement for the DC-3 for local service operations.

"The military services carry on the development making possible transport aircraft for the trunk carriers," he observed, "and I think Civil Aeronautics Administration should have funds to finance the developmental costs for a local service plane."

• **Airport program.** Monroney said the Administration's plan for $11 million in federal aid for fiscal 1956 would "retard" instead of promote airport development by holding out the hope of assistance to local governments.

"The Administration has stated that a small airport aid program is worse than no program at all because localities refrain from moving forward with developments in the hope of obtaining aid—and now the Administration proposes a small program."

Pointing out that the Administration is proposing a $100-billion, 10-year highway construction program and that local communities already have raised $102 million in matching funds for airport development, he suggested that "if Congress this year passes legislation reauthorizing a federal-aid airport development program, it might generate sufficient public sentiment to induce the Administration to expand its plans in this field. There are few airports in this country which are equipped for jet transports."

• **Airfreight.** Declaring he is interested in strengthening the position of all-freight carriers, Monroney proposed that "the answer might be development of airfreight forwarders which would have plane-load shipments available for the carriers at airports, after the pattern of forwarders for the railroads."

• **'New entry.'** Monroney anticipated that his subcommittee would look favorably on "new entries" into the air transportation system.

"The field is not being completely covered by existing certificated lines," Monroney declared, "and the door must be kept open for new types of service."

Members of Monroney's subcommittee are: Sens. George Smathers, Allan Bible, Andrew Schoeppel and Frederick Payne.

ATA Boosts Airport Contributions to Cities

Air Transport Assn. has prepared an airport manual outlining the contribution of the civil airport to community development, the first in a series of community relations projects.

ATA also is planning a motion picture on airports that is budgeted at $25,000.

The manual, being distributed primarily through airports, describes the importance of civilian airports in expanding existing business, attracting new industry and customers, offering employment, and increasing real estate values.

CAA Wants Higher Air Certificate Fees

Civil Aeronautics Administration will propose legislation this year authorizing it to inaugurate new fees and increase existing fees to put its certification and recording activities on a "self-supporting" basis, according to CAA administrator Fred Lee.

This is in line with the Eisenhower Administration policy presented to Congress last year by former Commerce Undersecretary for Transportation Robert Murray, now a special consultant to Commerce Secretary Sinclair Weeks.

Murray said: "With respect to charges for aircraft and airman certifications, we are planning to institute a system of charges which is calculated to return revenues at least equaling the cost of the services provided." CAA's cost for these activities is approximately $600,000 a year, and the income from fees only $175,000.

► **CAA Legislative Requests**—Other new legislation CAA contemplates proposing this year, "suggested by the report on civil air policy issued by the Air Coordinating Committee," Lee reported to the House Interstate and Foreign Commerce Committee, includes measures that would:

• **Provide for federal control** over the erection of tall structures that might be a hazard to air navigation. Bills already have been introduced in Congress by Rep. Carl Hinshaw and Rep. Oren Harris authorizing CAA to veto construction of television and radio towers over 1,000 ft. in height.

• **Authorize revision** in manufacturers' type certificates and aircraft airworthiness certificates to place "greater primary responsibility for safety" on industry.

• **Clarify CAA's authority** to operate a common system of federal airways for both military and civil aviation. The 1938 CAA Act authorizes CAA to operate only "civil airways."

• **Permit increased** government-industry cooperation in aeronautical development and training by authorizing the use of "the government's unique special equipment" to provide training and other technical services to industry on a reimbursable basis.

• **Extend the authority,** which will expire in September, permitting CAA to finance the service testing for prototypes of new aircraft models.

• **Extend CAA's jurisdiction** to regulate the activities of all U.S.-registered aircraft abroad. At present CAA's authority is limited to flights between a point in the U.S. and a foreign point. It does not have jurisdiction over aircraft operations between foreign points.

• **Permit renegotiation** of CAA agreements with local public agencies operating airports "so as to make all the agreements uniform, modernize their provisions, strengthen the more important obligations of the airport operators, and release them from those obligations which are not necessary or important for civil aviation."

• **Authorize the military** departments to transfer funds to CAA to permit federal-local cooperation in airport improvements required by the military through federal aid.

Lee said these CAA proposals have not yet been cleared by the Administration.

Other measures, recommended to past Congresses and to be re-submitted this year, include changes that would:

• **Authorize a government** corporation to operate Washington National Airport.

• **Re-define "airman"** in order to permit CAA to exempt employes of certificated repair stations and aircraft manufacturers from the requirement that all supervising mechanics hold requisite CAA certificates.

Airport Runway Aid

Use of federal airport-aid funds for runways will continue to be restricted to construction of a single runway at new airports and for improving the dominant runway at existing airports, Civil Aeronautics Administrator Fred Lee has emphasized in a policy restatement.

Exceptions to this policy, which is being followed by CAA in the 1955 airport-aid program, are to be considered only on a "case by case" basis. The runway policy was issued by Lee just prior to his scheduled appearance before a House appropriations subcommittee hearing on the $11 million requested for airport aid in fiscal 1956.

UAL Gets 25th DC-7

H. W. Thue (left), Douglas Aircraft Co. division manager, presents flight log to E. M. Hayes, United Air Lines, signifying delivery of carrier's last DC-7 in its initial order of 25 which cost about $56 million, including spares. UAL has contracted for an additional two DC-7s plus 10 DC-6Bs and five all-cargo DC-6As from Douglas.

CAB ORDERS

(Feb. 3-9)

GRANTED:

Whitehorse Flying Services, Ltd., a temporary foreign air carrier permit authorizing irregular service between Canada and Alaska for three years.

Flying Tiger Line an exemption to perform a maximum of 20 roundtrip New York-London flights between July 10 and Aug. 20, 1955, pursuant to an agreement with the Watchtower Bible and Tract Society.

Transocean Air Lines an exemption to perform a maximum of 14 roundtrip New York-London flights between June 24 and Aug. 11, 1955 pursuant to a contract with the American Baptist convention.

APPROVED:

Intercompany agreements between Braniff Airways, American Airlines and various other carriers.

An agreement among Alaska Coastal Airlines, Cordova Airlines, Ellis Air Lines, Northern Consolidated Airlines, Reeve Aleutian Airways and Wien Alaska Airlines relating to articles of association of the Alaska Air Transport Assn., with certain reservations.

DISMISSED:

Investigation and suspension of a rule proposed by National Airlines regarding baggage loss and damage claims, since the rule has been canceled.

DENIED:

Resort Airlines and National Airlines motions for consolidation of certain applications with Resort's certificate renewal case.

SHORTLINES

► **American Airlines** adds a through-plane flight, the "Golden Gate," from Washington to San Francisco via Tulsa on March 1.

► **Pioneer Air Lines** carried 160,629 revenue passengers in 1954, a 9% increase over 1953. Load factor was 50.53% compared with 42.67% for 1953. Operational merger of Pioneer with Continental Air Lines is planned Apr. 1.

► **Trans World Airlines** reports January traffic up 10% over January 1954. TWA flew 229,323,062 revenue passenger-miles last month—200,767,603 domestic and 28,555,459 international.

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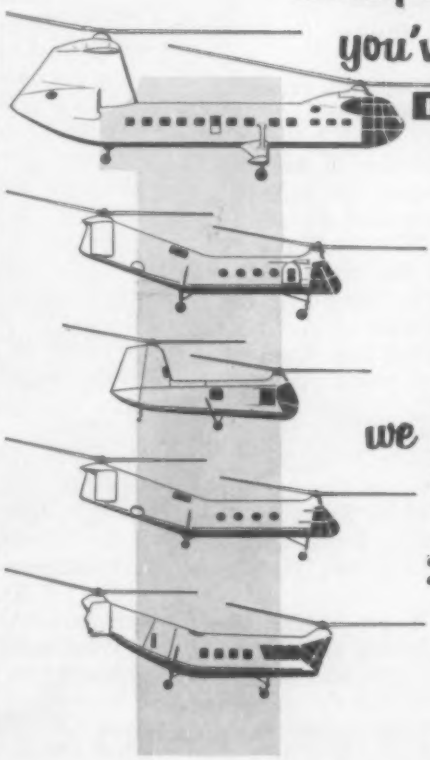

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EDITORIAL

Our Engine Development Problem

A longrange jet engine development program is being studied by the Department of Defense. Charles E. "Engine Charlie" Wilson, Defense Secretary, has publicly stated that he is giving the problem his personal attention because "it needs improvement."

"Over the past few years," Wilson said, "there have been too many engine development projects that have failed completely or have seriously delayed aircraft production."

Airframe manufacturers who have been victims of an engine program collapse and Pentagon planners who have seen their newest airframes reduced to gliders for lack of suitable power will agree with Wilson.

The record is clear that the hundreds of millions of taxpayers' dollars invested in jet engine development since 1946 have not yielded the dividends anticipated. However solid the engine builders' production record, the development picture has not been bright. Of the five large engine builders, only General Electric and Pratt & Whitney Aircraft have avoided major development fiascos.

International Race

In the development race, international competitors have given the United States a rough time.

For example:

- Britain has developed three turbojets in the 10,000-lb.-thrust class—the Bristol Olympus, the Rolls-Royce Avon R.A. 28, and the Armstrong Siddeley advanced Sapphire. U. S. has only the P&WA J57 in this class.
- Russian technicians developed the centrifugal flow Nene design to more than 6,000-lb. thrust long before their U. S. counterparts. The Russian advanced Nene was powering the MiG-15 in combat over Korea when the P&WA J48 was going into early production versions of the Grumman Cougar.
- Three British engine designs have been imported into this country for production to fill holes in the U. S. development cycle—the Rolls Nene and Tay centrifugal flow types and the Armstrong Siddeley Sapphire. Two large U. S. engine firms still are using British advanced designs and development skill to bolster their own programs.
- There are indications that U. S. gas turbine teams may also be losing the race to develop the first truly supersonic engine. Much of this battle still is cloaked behind military security regulations, but the occasional rifts in the security curtain are not encouraging.
- There also is evidence that in their necessarily urgent quest for more and more power American manufacturers neglected to develop a complete spectrum of jet types. As a result, domestic airframe manufacturers must turn to the French Marbore and the British Soar when they want low-powered, lightweight, economical jets for helicopters, trainers, missiles and target drones.

Wilson's Defense Department team charged with investigating the engine development picture has at least two members with practical experience in the field and their presence must be heartening to the aircraft industry. Roger Lewis, Assistant Secretary of USAF for Materiel, has a long background in aircraft manufacturing. James Smith, Assistant Secretary of the Navy for Air, has the practical consumer's approach from his long experience as a pilot. Frank Newbury, a retired veteran of 45 years with Westinghouse Electric Corp. who is now Assistant Secretary of Defense for Applications Engineering, completes the probing trio.

Competition Needed

There are many pitfalls of the past that should be avoided in organizing any future engine development program. However, it is disturbing to note that in preliminary Pentagon planning on this score there was a strong tendency to establish rigid bureaucratic development standards and to further throttle the competitive instincts in the aircraft industry. Reduction of competition and blocking the development future into neatly assigned projects offers a superficial attraction of orderliness and economy. Anybody who has had practical experience with the problems of aircraft engine development knows that this is a mirage.

Competition has been the life-blood of American industrial development and the aircraft engine industry has been no exception. Lest the attractions of Pentagon super-planning appear too attractive, let's look at some of the past examples of what dependence on a single source of military judgment would have done to American airpower.

Dangerous Decisions

We can still remember the pre-war Army Air Corps ukase that the future belonged to liquid-cooled engines and its public abandonment of air-cooled development. Where would the thousands of air-cooled engines that powered the Thunderbolts, Liberators, Skymasters, Corsairs and Hellcats of World War II have come from if the Navy had not kept air-cooled development alive?

What would have happened if the Navy's 1947 veto of the J57 design proposal had been final and there had been no USAF to pick up the option the Navy dropped?

What would be the future of the USAF turboprop-powered fleet of transports for its aerial logistics system if its rejection of the propellor turbine in the pre-Korean years had not been backstopped by the determined effort of the Navy's Bureau of Aeronautics to keep the Allison T40 and P&WA T34 programs alive and bank its scarce research and development dollars on faith in the future of the turboprop?

Anything that will curb the inventive spirit of the industry's engineers or the competitive stimulus of its managers will harm, not help, the future of American jet engine development.

—Robert Hotz

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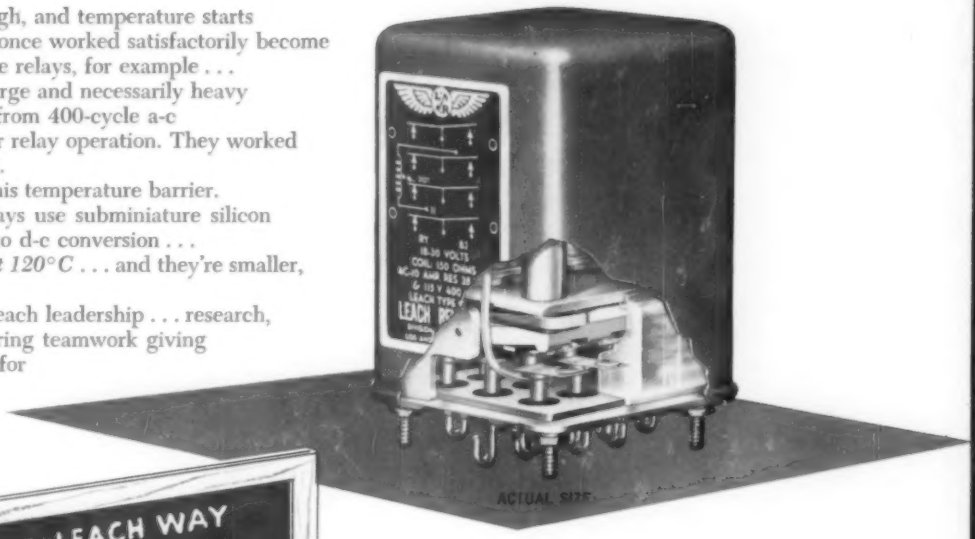

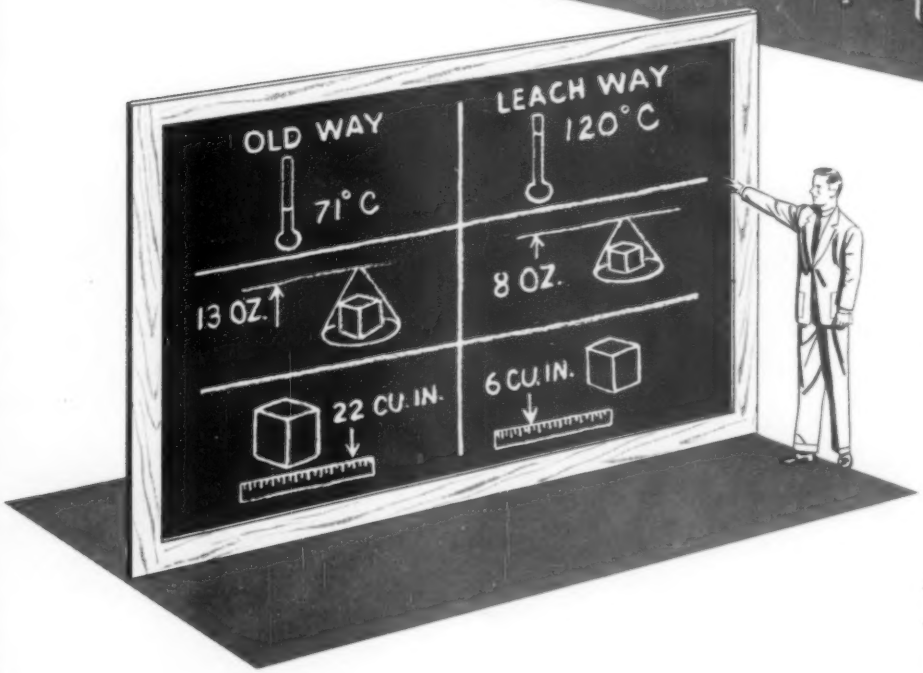

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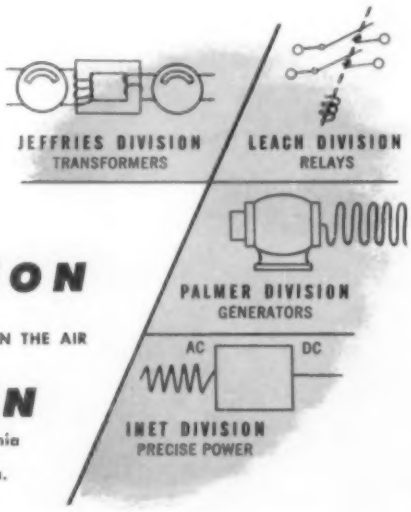

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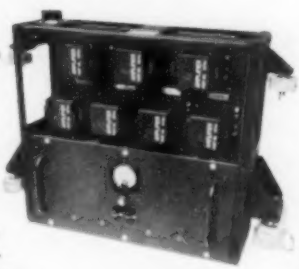
B-47 "STRATOJET"

Uses this Amplifier and Power Supply Rack . . . another Servomechanisms' "building block" system



This sub-system is another outstanding example of Servomechanisms' packaged function philosophy.

Consider the seven SA104H Servo Amplifiers used in this system. Servomechanisms has designed and produced over 40,000 of these amplifiers. All are 100% electrically and mechanically interchangeable. They are a USAF standard — designated Type A-1 — and as such are "shelf items" in supply depots throughout the world.

As a USAF standard, these amplifiers are used in many other systems in almost every modern fighter aircraft.

This demonstrates how Servomechanisms' packaged electronic functions have helped standardize and simplify fire control equipment—and why designers and users of control equipment specify Servomechanisms, Inc., for economy and reliability.

The reliability of Servomechanisms' equipment is directly traceable to the ease of maintenance inherent in the "building block" philosophy.

SERVOmechaNISMS INC.
PACKAGED FUNCTIONAL COMPONENTS

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